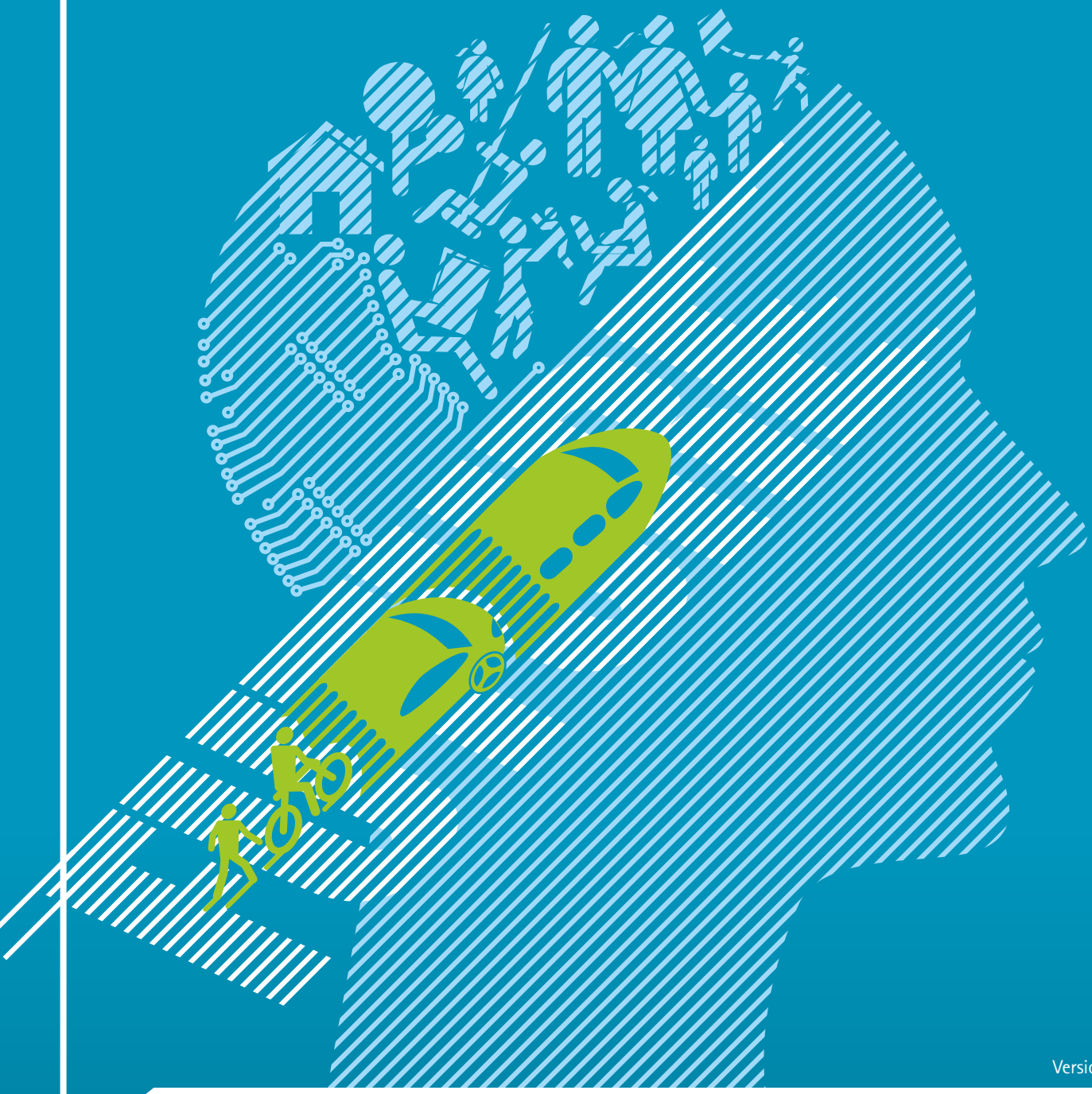
# Mobility of the Future
# Preliminary Results
# Mobility of Persons

Research, Technology and Innovation from Austria



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The grant recipients provided the bmvit with the articles on the RTI projects (project fact sheets) for publication. We wish to thank them for their assistance!



**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.

# Foreword

Cities are growing, society is ageing, digitalization is changing the world: All of that and much more is having direct impacts on our mobility options and on our mobility behavior. In view of our ambitious climate goals and dwindling resources, research in the personal mobility area is the key to an efficient, safe, environmentally friendly, and socially responsible transport system.

Novel holistic concepts are needed, particularly in personal mobility. In this topic area, the Austrian Ministry of Transport has provided a total of approx. 20 million euros worth of funding over the past five years to approx. 100 research projects in the scope of our "Mobility of the Future" research program. The focus in all projects is on the needs of the people and society, as technological innovations always have social impacts. Hence innovative social practices are needed in order to bring about a mobility change.

Examples of the focuses of our research include barrier-free and accessible mobility solutions for all, new methods and instruments in transportation land use and also affordable mobility, even for those who do not own cars. My department has furthermore invested a total of four million euros in mobility laboratories, in which we are testing the future of mobility in real world and living lab settings. In the beginning of the year, we also started the bidding process for a new "Digitalization and Automation in the Transport and Mobility System" endowment professorship.

This brochure makes innovative solution approaches of the future visible. It provides a concise overview of our support measures and of the resulting research projects and findings in the "Shaping personal mobility in an innovative way" *(Ger.: Personenmobilität innovativ gestalten)* thematic field. With this publication, we hope to contribute to the practical implementation of the findings and to stimulate further research on the basis thereof. I hope that you will find it interesting and informative reading.

**Source:** bmvit / Zinner

**Jörg Leichtfried**
Federal Minister of
Transport, Innovation
and Technology

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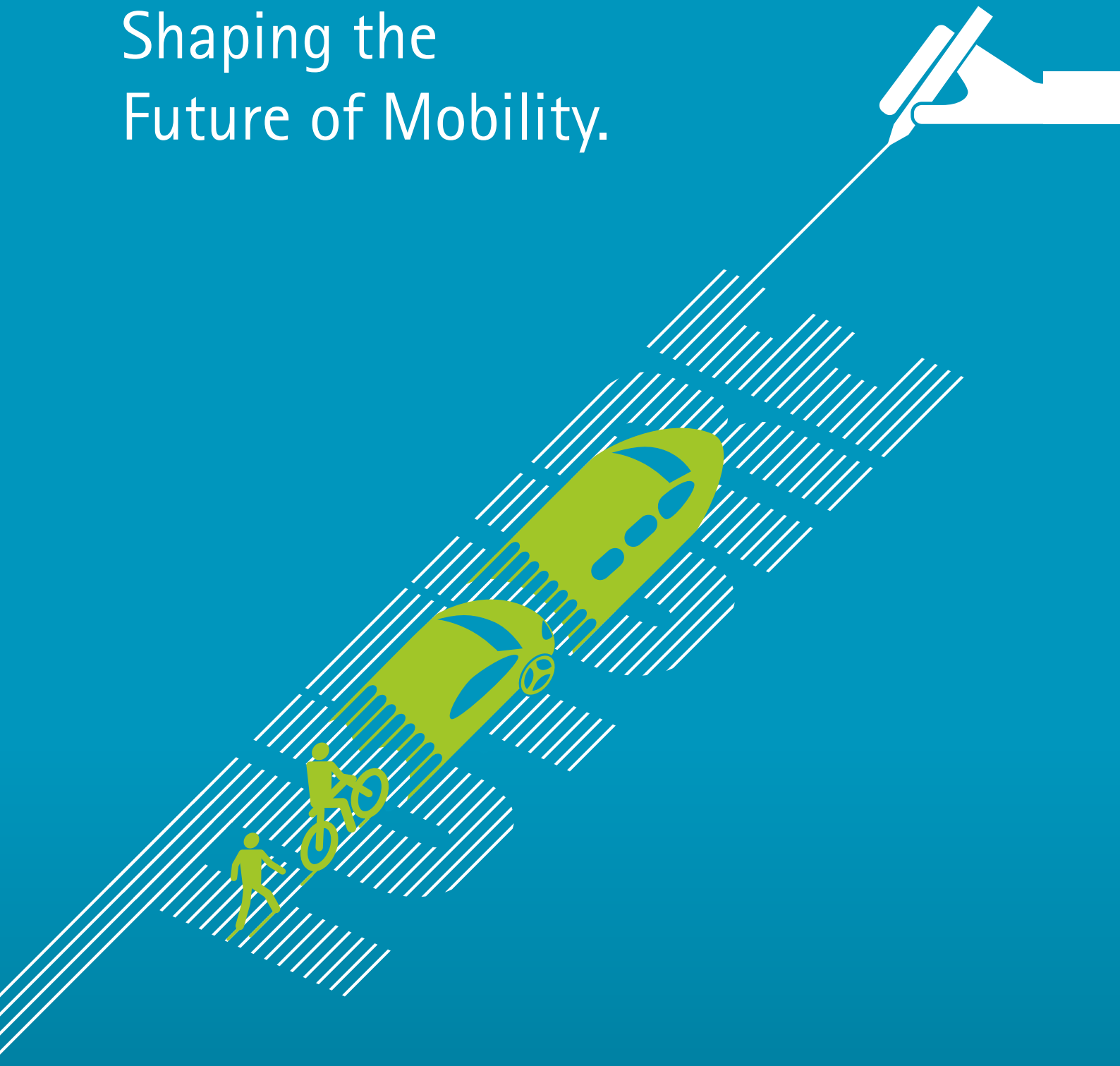
# 1.
# Shaping the Future of Mobility.



# Classification and Role of the Mobility of the Future Research Funding Program

The **RTI (Resesarch, Innovation, Technology) strategy of the Austrian Federal Government**[1] focuses on the further development and overall implementation of the potentials of science, research, technology and innovation in Austria, in order to meet the major social and economic challenges of the future and to make Austria one of the most innovative nations in the EU by the year 2020. The Austrian Federal Ministry of Transport, Innovation and Technology (bmvit), which under the Bundesministeriengesetz [Austrian Federal Ministries Act] is responsible for promoting economic-technical research as well as applied research in Austria, defines **three objectives** for its measures:

- Increase the research, technology and innovation intensity of the Austrian business sector
- Develop technologies for a modern, efficient, high-performance and secure infrastructure for meeting the major future challenges of climate change and resource scarcity
- Increase the number of persons employed in the technology and innovation field, with particular emphasis on increasing the percentage of women

To address these objectives, in the applied research field the bmvit is implementing measures for **international cooperation** in order to support participation by Austrian businesses and research institutions in the development, operation and use of outer space infrastructures and programs, measures related to **RTI infrastructure** in order to position Austria as a leading-edge technology research center in the area of non-university, economics-oriented research, as well as measures related to **RTI grants**. The bmvit thus hopes to increase the quality and quantity of applied research and technology development, especially with regard to the topics of mobility, environment and energy, production, information and communication technologies (ICT), safety, outer space and human resources, and simultaneously increase the percentage of women in qualified positions in the research, technology and innovation (RTI) area.

With regard to the respectve thematic priorities, the specialist departments such as the Department of Mobility and Transport Technologies (Abteilung Mobilitäts- und Verkehrstechnologien, III/I4), are developing multi-year **RTI programs** with strategic and operative goals. **The Mobility of the Future (Mobilität der Zukunft, MdZ)**[2] program addresses transport and mobility-relevant challenges (other than those in aviation). In the scope of **semi-annual thematic calls for proposals with priorities** in individual **thematic fields,** support is provided to research projects that can be expected to contribute to the program goals (mission-oriented research). The Austrian Research Promotion Agency (Österreichische Forschungsförderungsgesellschaft mbH, FFG) is responsible for processing the respective calls for proposals, which it does on the basis of defined contents, budgets and funding instruments.

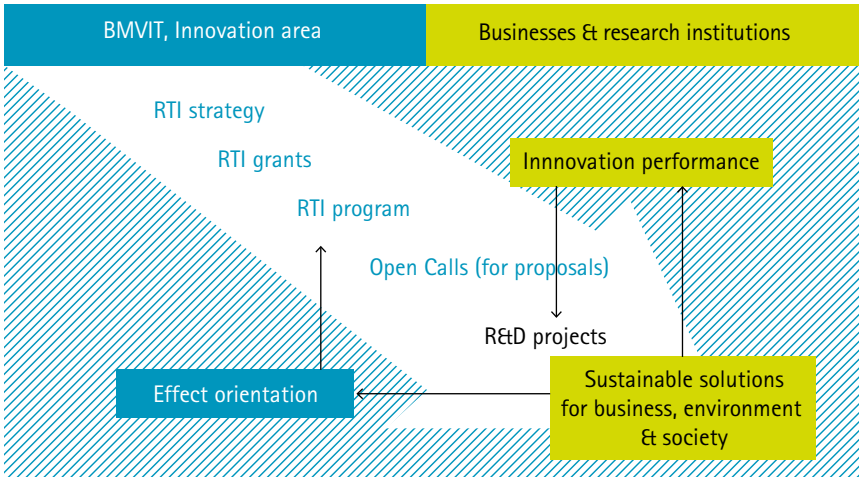


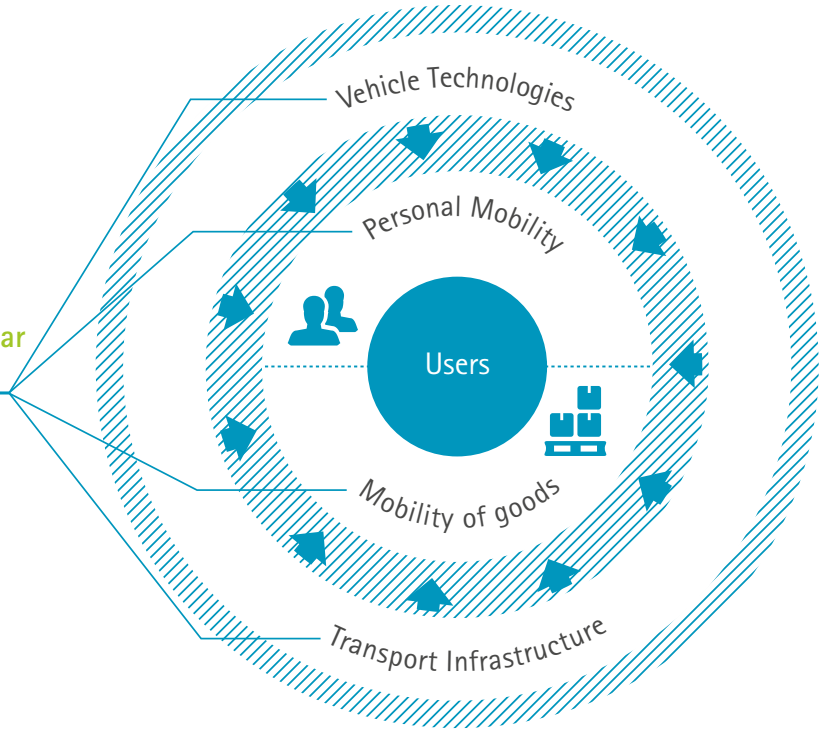

Figure: From the RTI strategy to sustainable solutions for business and economics, environment and society

**Applied research** generates new knowledge, with the goal of focusing on a specific application. Target groups of applied research promotion: Businesses and research institutions that are interested in building knowledge in the respective application fields such as mobility and/or in conducting research on and developing novel or improved products, processes, services or business models in the application fields, or in innovating in these fields.

1) http://ec.europa.eu/growth/industry/innovation/facts-figures/scoreboards/index_en.htm (Version: 06.06.2016)
2) http://www.bmvit.gv.at/mobilitaet/index.html (Version: 06.06.2016)

# Mobility of the Future

- Runtime: 2012–2020
- Budget: approx. 15–20 mill. EUR/year
- 4 thematic fields:




## Strategic program goals

### Society

- Usability and accessibility of the transport system
- Sustainable mobility forms and models
- Quality and availability of the transport infrastructure in spite of difficult economic framework conditions
- Ensuring the supply of goods and services

### Environment

- Reduction of emissions and immissions
- Reduction of energy and resource consumption
- Balance of interests among tranport routes, human living spaces and ecosystems

### Business & research

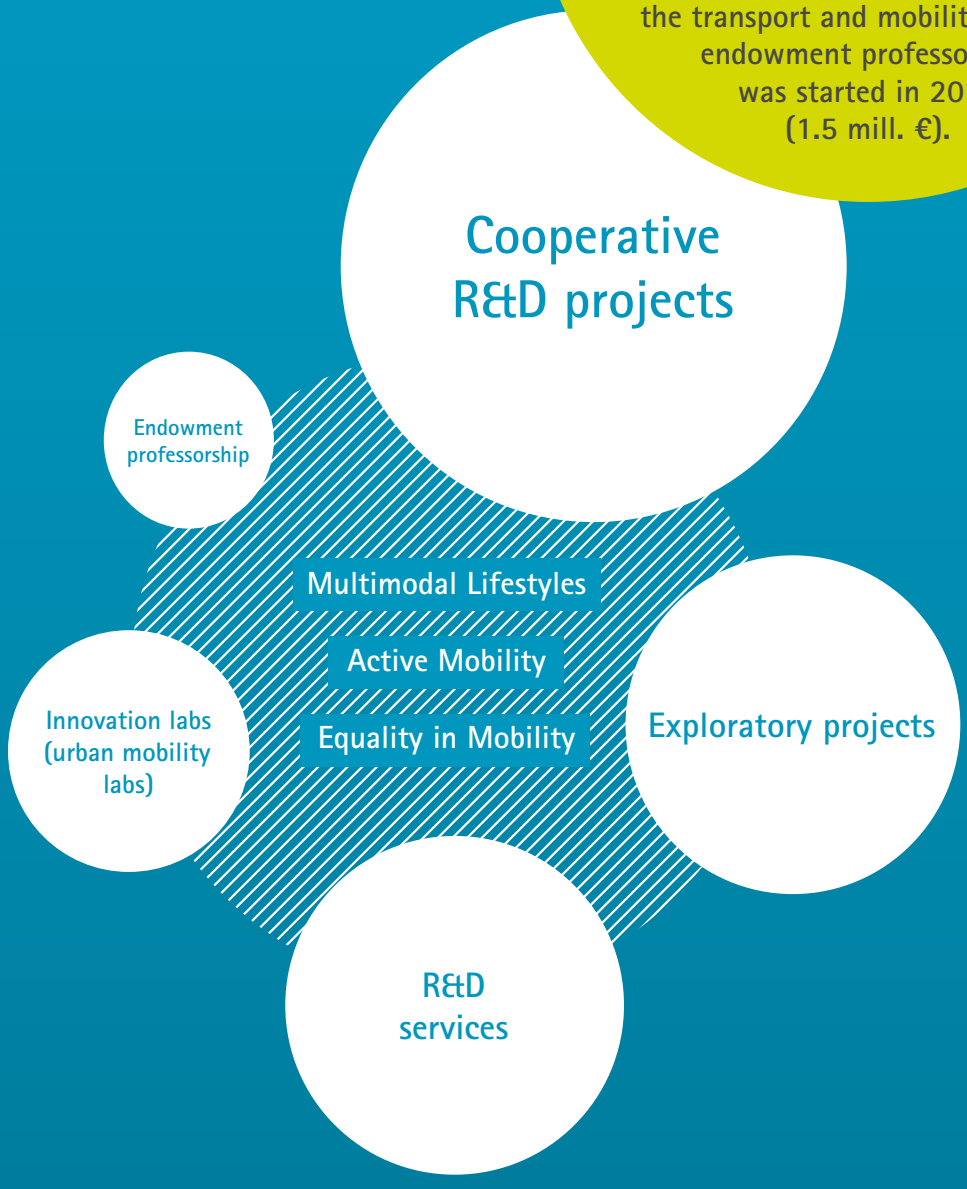
- Competetiveness in the transport sector
- Competence leadership in the mobility area
- Development and stimulation of international cooperations

## Operative program goals

1. Support for **technological innovation** in the area of mobility
2. Support for **social and organizational innovation** in the mobility system
3. Strengthening of the link between RTI policy and transport policy
4. Expansion of **knowledge and networks** in the mobility area

# 2. Personal mobility. Taking stock.

96
RTI projects and initiatives with 18.5 mill. € of funding for the 2012–2016 time period: 4th ways2go (IV2Splus program) call for proposals, three MdZ calls for proposals, and an exploratory call for proposals for urban mobility laboratories. In addition, five urban mobility laboratory implementation projects will be funded (4 mill. €), and the bidding process for a "Digitalization and automation in the transport and mobility system" endowment professorship was started in 2017 (1.5 mill. €).



# Personal mobility in mission-oriented research

## From IV2Splus/ways2go to Mobility of the Future "Shaping personal mobility in an innovative way"

User-specific needs and social change processes were prioritized with the ways2go program line in the IV2Splus program. A broadly defined research and innovation process with four calls for proposals resulted in novel interdisciplinary and cross-stakeholder cooperations, with very promising results, in more than 100 projects in the 2008-2012 period. These efforts were pursued further in the "Shaping personal mobility in an innovative way" thematic field in the subsequent "Mobility of the Future" (Mobilität der Zukunft, MdZ) program. However, other priorities in terms of a "learning mission-oriented program" were also set. These priorities were identified in the program evaluation process.

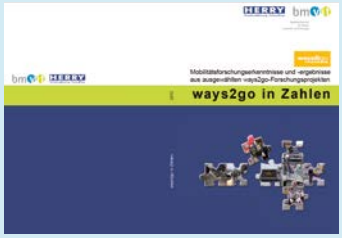
As a mission-oriented program, MdZ aims to support the further development of the mobility system, especially where solution approaches are needed for mobility-relevant social challenges and where RTI measures have the potential to make substantial, medium to long-term contributions to solutions. The program also supports research initiatives that will stimulate existing markets or generate new markets through innovations.

The MdZ program is characterized by

- **Clear mission-oriented alignment** of the research programs in accordance with the RTI strategies of the Austrian Federal Government, i.e., the emphasis lies on the contribution to meeting social challenges
- **Pursuit of holistic solution approaches,** which go above and beyond the physical manifestation of mobility (transport) and also deal with upstream and downstream decision making processes.
- Taking a **comprehensive understanding of innovation** and consequently an orientation to user needs as a basis, i.e. the users form the starting point for all solution approaches. In the context of complex social interrelationships, technologies merely represent one possible solution path; social and organizational innovations in the mobility area are playing a complementary and increasingly greater role and demanding more cross-stakeholder, multi- or interdisciplinary research cooperations.
- **Long-term thematic orientation framework,** i.e. along with generating impetus, a continuous integration of sponsorship in strategic thematic fields is also a priority for being able to induce systemic changes and initiate disruptive innovations, for example.
- Assurance of a **flexible program design,** i.e. rather than defining "rigid program lines", provision shall be made of flexible intervention mechanisms, which will be integrated in a comprehensive topic management scheme in terms of a broader understanding of innovation. This also means that more calls for proposals can be issued for multidisciplinary projects. In order to do justice to the high complexity, intensive program supervision and quality assurance shall also be arranged.

Each of the four thematic fields of the program will have different (but in some cases also overarching) priorities. Program activities and instruments will be used in different ways, depending on the respective topic-specific mission. As a systemic innovation field, the "value creating" (i.e. the social application or application potential of technologies and innovations in the organizational and social context of the mobility system) is at the forefront in personal mobility.

ways2go


**Content of this publication:**
Since many projects from the IV2Splus/waysgo and MdZ/Personal Mobility programs seamlessly integrate with one another, the documentation of the brochure also includes subsequent projects and program activities in addition to the prior publications (see "Innovation Interim Assessment 2011" and "ways2go in Numbers 2012"). Also included are the 4th IV2Splus/ways2go (2012) call for proposals as well as three calls for proposals for the MdZ program and the Urban Mobility Laboratories (UML) in the years 2013-2016.

## Topic-specific mission and implementation of "Shaping personal mobility in an inovative way"

Social prosperity, social cohesion, economic prosperity, a livable environment and consequently a high quality of life are decisively influenced by both physical mobility opportunities and the prevailing mobility structure. The main challenge in the area of personal mobility lies not only in ensuring that mobility-relevant needs are satisfied and that the basic functions of existence (living, working, education, shopping, recreation) are fulfilled through suitable mobility services and offerings, but also in steering the population toward more sustainable mobility paths.

Accordingly, the personal mobility of the future will be characterized by a combination of technological and social changes that will not only permit a seamless meshing of the various transport modes, but will also help change mobility behavior in such a way as to make sustainable and user-friendly personal mobility solutions available to everyone, according to their needs. Given this background, research and development in the "personal mobility" innovation field should stimulate corresponding learning and change processes and/or bring about the sustainable mobility solutions that are needed in the complex operating realm of space-society-environment.

| Target level | Program objective | Impacts |
|---|---|---|
| Society | Usability and accessibility of the transport system | ●● |
| | Sustainable forms and patterns of movility | ●● |
| | Quality and availability of the transport infrastructure | ● |
| Economy and research | Competence leadership in the mobility area | ●● |
| | Competitiveness of the transport sector | ● |
| | Development and stimulation of international cooperations | ● |
| Environment | Reduction of emissions and immissions | ● |
| | Reduction of energy and resource sonsumption | ● |

Legend: ●● priority ● substantial

Figure: Program objectives and anticipated priority impacts in the "Shaping personal mobility in an innovative way" topic field: source bmvit Program Document "MdZ"

The "Shaping personal mobility in an innovative way" thematic field therefore aims to generate suitable impetus in selected impact areas and set up a suitable framework for action, within which publically and privately funded R&D and innovation activities complement each other in an effective and efficient manner. The goals pursued in the thematic field go beyond the area of RTI policy and address, for example, requirements such as those of transport, environmental, social, or health policy. The goal of the "Strengthening of the link between RTI policy and transport policy" program therefore plays a key role in the personal mobility thematic field. For instance, research provides innovative concepts, products and services for achieving transport policy goals, but by the same token requires suitable transport policy framework conditions for the intended "value realization". On the other hand, research and innovation broaden the spectrum of possible options and, through exploratory approaches, reveal needs in the transport policy area, which in turn can generate significant impetus for the long-term prospects of transport policy. Starting points for mission-oriented research can be deduced from current survey findings.

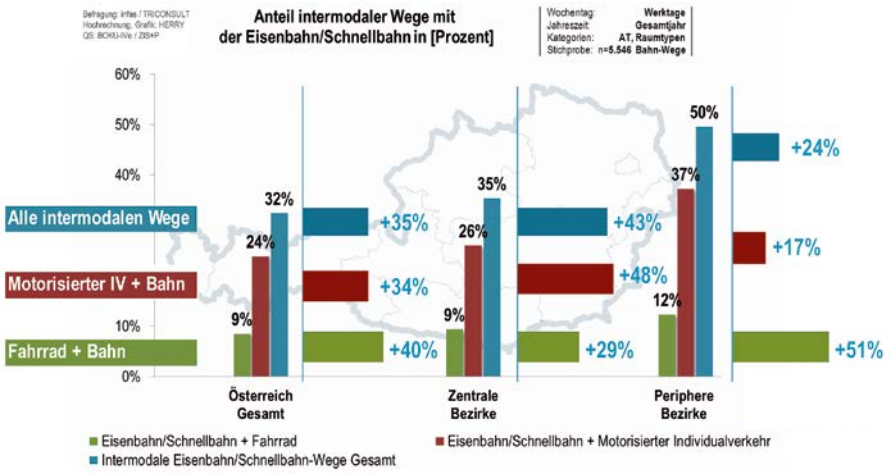



Figure: Intermodal railroad/suburban railroad trips 2013/2014 with relative change since 1995; source: Österreich unterwegs 2013/2014 www.oesterreich-unterwegs.at; graphics Roider, Tomschy 2017.

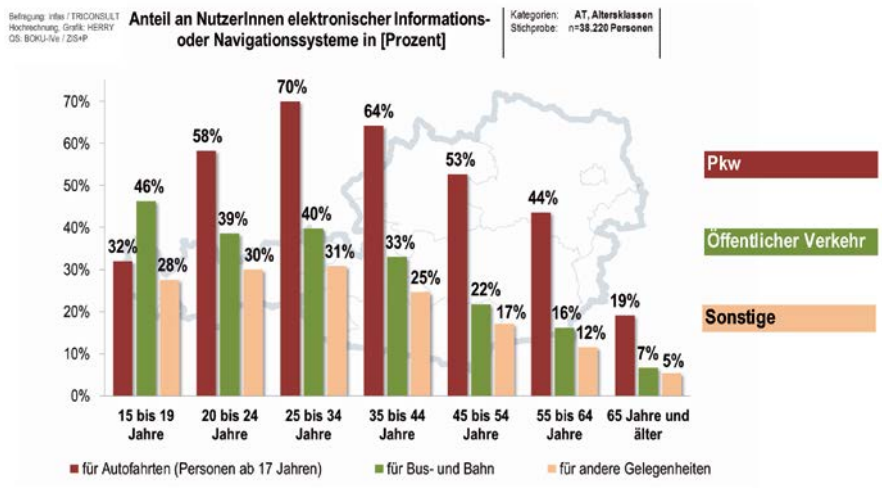



Figure: Technology use in individual age groups: Use of navigation devices, cell phones or other electronic options for obtaining information on routes, connections, times, etc. in the transport system; source: Österreich unterwegs 2013/2014 www.oesterreich-unterwegs.at; graphics Roider, Tomschy 2017.

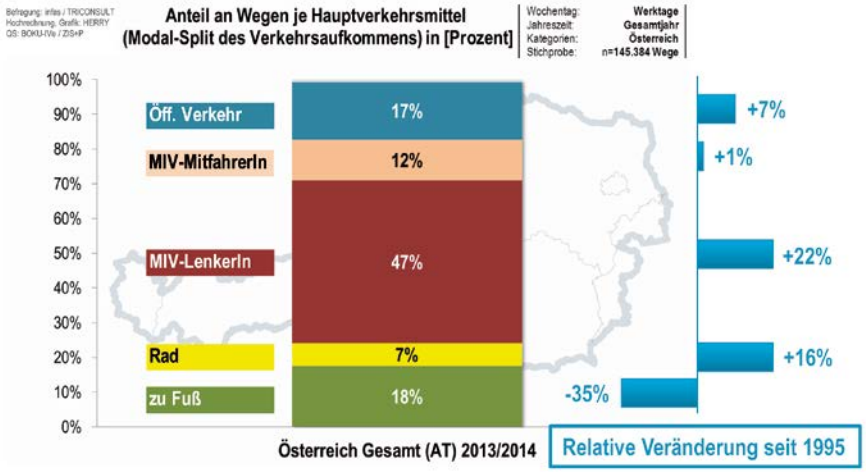



Figure: Modal split in Austria, 2013/2014 (volume) with relative change since 1995; source: Österreich unterwegs 2013/2014 www.oesterreich-unterwegs.at; graphics Roider, Tomschy 2017.

Research projects provide knowledge bases for future-oriented tranport policy strategies and measures. As part of the KOMOD (KOnzeptstudie MObilitätsDaten Österreichs) research project, a standardized method and a "tool box" were developed for the national (Austrian) mobility survey.

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www.oesterreich-unterwegs.at

In order "to be able to shape personal mobility in an innovative way" in keeping with the program, new mechanisms of intervention and funding are needed in the RTI policy. Given the background of a broader understanding of innovation and of the discussion on transitionled policy approaches, the spectrum of forms of political intervention deemed as legitimate in innovation proceeses has widened (OECD 2012). Accordingly, traditional market and system failure arguments are no longer accepted as sole justification for government intervention and support. So-called transformative system failure is now also accepted as grounds for justifying new forms of intervention.

In this context and in keeping with the program goals, the topic-specific program interventions no longer focus on just innovation, but to an increasingly greater extent also on transformation and transformation management. In the innovation process, the goal is not just the achievement of "innovations per se" (especially in terms of economic and industrial objectives), but also the achievement of innovations with the aim of bringing about a transition toward sustainable personal mobility, which in particular also emphasizes the social dimension of mobility.

In the context of the RTI policy roadmap for orienting the "Mobility of the future" RTI measures in the "Shaping personal mobility in an innovative way" thematic field, the necessary new intervention mechanisms and instruments were identified and the thematic orientation of the thematic field was established (mission, key topics and research questions in the three priority research and innovation fields).[1] The three priority research fields of multimodal lifestyles, active mobility, and equal opportunity mobility address topics and contents in Austria with demand for action in terms of transport developments plusma need for intervention from a transport policy standpoint on the one hand, and for which there are substantial knowledge gaps and potentials for innovative solutions from the research perspective on the other hand.

In recent years it has been possible to implement (in pilot form) many of the intervention mechanisms and instruments defined in the context of the RTI roadmap. The following aspects shall be examined in greater depth in the subsequent parts of this brochure:

- Stimulation of new and fundamental knowledge that is strongly rooted in transport policy through the "Grundlagenorientierte Mobilitäts- und Verkehrsforschung [Basic Mobility and Transport Research] (GLOMVF)" Initiative (see p. 90)
- Pursuit and accompaniment of long-term innovation and transition paths, creation of learning and experimental spaces and cross-stakeholder translation processes through the designing and implementation of "urban mobility laboratories" and the introduction of a new "innovation laboratories" funding instrument (see p. 108)
- Support of novel and unconventional ideas through the pilot set-up of an unconventional think tank ("Querdenkerecke") (see p. 95)
- Overarching coordination processes with stakeholders from other policy areas in the scope of the preliminary study of and subsequent activities in convergence topics (e.g., mobility and health/dementia) as part of "Lebensqualität und demographischer Wandel" [Life quality and demographic change] RTI-AG 3 (see p. 91)
- Creation of suitable methodological bases for multidimensional impact monitoring (see p. 99) and synoptic assessment in the scope of this brochure
- Promotion of social innovations in the mobility area (see p. 16)

**Innovation** is the development, introduction and diffusion of a novel or significantly improved product (good or service) or process, marketing method, or new organization method in business practices, workplace organization, or external relations. The goal of innovation in terms of mission-oriented research promotion is the mastery of current challenges (reaction) or the proactive anticipation of future problems or the taking of opportunities (action). (Source: Project Querdenkenquerdenken 2016 with additions)

**Transition** can be described as a gradual, continuous process of change that sustainably alters the structural character of the social mobility system. Long-term social goals viewed as vision should be worded with sufficient clarity for guiding and appropriately orienting research activities. Transition management is understood as meaning an approach in which long-term goals are used to control short-term developments and experiments. Another important task of transition management is to address barriers within transition paths. Different transition paths on the mobility system level are interdependent (source: Farla, Alkemade et al. 2010).

1) Wagner, Wasner, Weber, Whitelegg, RTI-politische Roadmap "Personenmobilität innovativ gestalten", 2014

## Mission in the three research fields:

In the **"Multimodal lifestyles" research field,** the MdZ program is contributing, through research, toward integrating new mobility options in lifestyles and toward stimulating or preparing for necessary structural changes to this end. Social changes represent both challenges and opportunities to break rigid use patterns and to establish sustainable forms of mobility - including ones that go beyond "renunciation". Social developments in different fields of activity (living, work, recreation, etc.) and the interconnections thereof must therefore be investigated from the perspective of deriving, developing and demonstrating mobility solutions through innovations in terms of applications, systems, components, processes, practices and services that

- lead to new action paradigms and qualities (e.g., "mobility as a service", integrated, seamless, comfortable, easy, etc.),
- establish alternatives to private vehicles (or to the conventional use models thereof) in the overall transport system, strengthen multi- and intermodal uses of existing transport means and forms of mobility or enable such uses through new transport systems,
- support awareness raising regarding and motivation to adopt multimodal lifestyles in workday mobility,
- and demonstrate the tools and methods needed to do this.

In the **"Active Mobility"** research area, the MdZ program is contributing, through research, towards establishing muscle power mobility (or aided muscle power mobility) as the dominant form of mobility (particularly in the urban environment). To this end, the program is also contributing towards obtaining new findings, potentials and solution approaches in different spatial structures, population groups, living situations, etc. The innovations thus envisaged in terms of applications, systems, components, processes, practices and services include

- Transport means/transport infrastructure (and their interfaces),
- Mobility tools and services for active (daily) mobility for increasing comfort, safety, etc.,
- Tools and methods for awareness raising regarding and motivation towards adopting active mobility practices, also with starting points in other activity fields interlinked with the transport system (e.g., health, sports, leisure and recreation, etc.),
- Tools and methods for planning, for policy making and implementation, for improving spatial, structural and organizational prerequisites and also for impact monitoring.

In the **"Equality in mobility"** research area, the MdZ program is contributing, through RTI, towards assuring the socially necessary function of mobility in terms of participation by the population. The purpose is to make self-determined mobility possible and thus secure or increase life quality. In this regard, social developments (e.g., demographic change), problems and needs (e.g., handicaps) are being researched with the aim of stimulating or developing, in a participatory manner, new mobility solutions through innovations. A further aim is to investigate and/or demonstrate the use potentials of these new solutions. In terms of applications, systems, components, processes, practices and services, the priorities of the innovations thus envisaged are:

- a social and inclusive designing of the transport system (eliminating/minimizing physical and/or cognitive barriers, ensuring accessibility and reachability, guaranteeing affordability),
- support of disadvantaged user groups in self-determined and autonomous (workday) mobility through new and/or improved mobility applications, taking solution approaches into account that all (or as many as possible) population groups can use whenever possible,
- enabling or ensuring the participation and inclusion of the population in projects relating to mobility and transport,
- tools and methods needed for planning, policy making and implementation, and also impact monitoring.

**RTI Policy Roadmap**

**"Shaping Personal Mobility in an innovative way"**

## The impacts of the program in the "personal mobility" theme – an initial overview

For the reason of a pending interim evaluation of the MdZ program,[2] at this point we can only present preliminary analyses based on questionnaires and a review of the definitions in the RTI Roadmap.

According to the assessment of the research community (online survey of 166 individuals), through topic-relevant interventions the program was able to make effective contributions in many mobility-relevant areas. Especially in the areas of action and activity of priority (and defined according to the program goals) for personal mobility, the program is exerting "much" or "very much influence" (sustainable forms and patterns of mobility, usability and accessibility of the transport system, competence leadership). As expected, the impacts were less pronounced in the activity fields of the program that are less relevant to the personal mobility thematic field, i.e., ones with priorities in other program goals (e.g., quality & availability of the transport infrastructure, ensuring the supply of goods & services).

In addition, impacts on "user involvement in new solutions" and in the area of "scientific knowledge building/scientific competence" are particularly pronounced. However, there are also noticeable impacts in the "novel and unconventional ideas" and "competitiveness of the transport sector" areas. Two thirds of those surveyed see much or very much influence of the program on the "practicality of new products or on practical action skills." However, only every other person surveyed stated that the thematic field of the program had "much" or "very much" influence on political/strategic action skills. In keeping with its mission statement, the program therefore needs to exert more impact in this area in the future.

**How would you rate the impact of the Mobility of the Future program on the following areas in the "Shaping personal mobility in an innovative way" thematic field?**

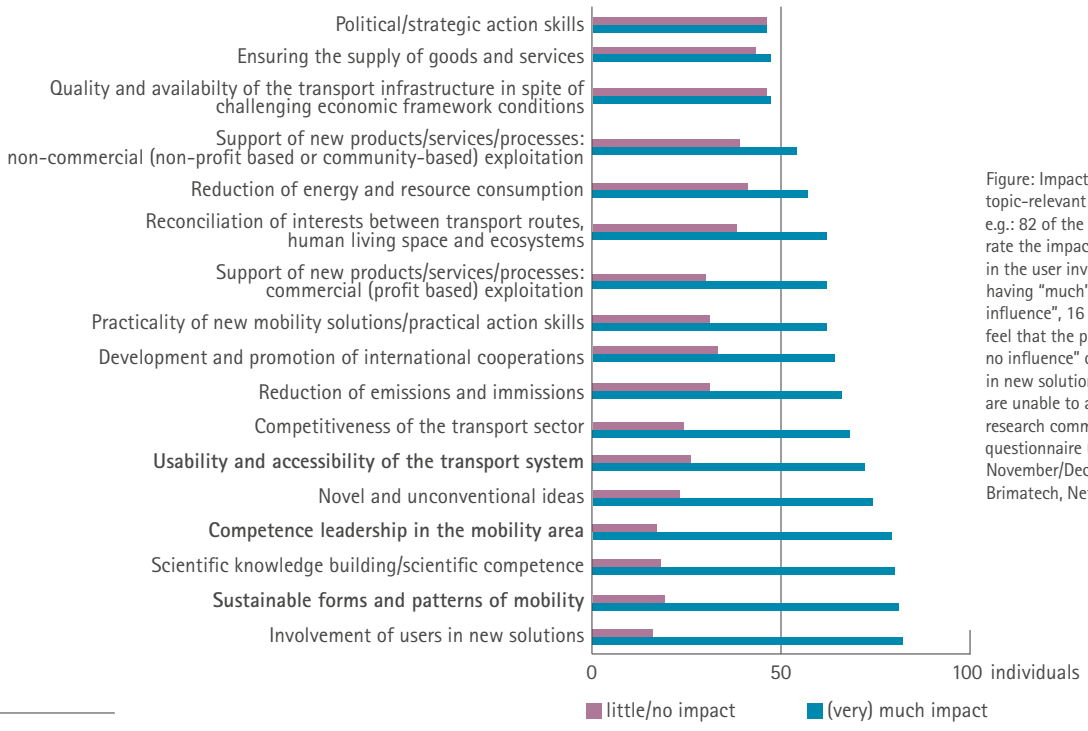



Figure: Impact of the program in topic-relevant prioritizations; e.g.: 82 of the persons surveyed rate the impact of the program in the user involvement area as having "much" or "very much influence", 16 individuals feel that the program has "little/no influence" on user inclusion in new solutions. 10 individuals are unable to assess this; source: research community online questionnaire (n=114), November/December 2016, Brimatech, Netwiss, bmvit.

2) planned for mid-2018

On the research project level, it is clear that the majority of the sponsored projects are relevant to the "Multimodal Lifestyles" research field. The "Equality in Mobility" and "Active Mobility" research fields play a more or less equally large role in the project contents (online survey of the heads of 95 research projects). As a rule aspects of several research fields are addressed and synergistic effects are sought in a given research project (e.g., multimodal lifestyles by making active forms of mobility more attractive, accessibility of the transport system through new solutions for active mobility).

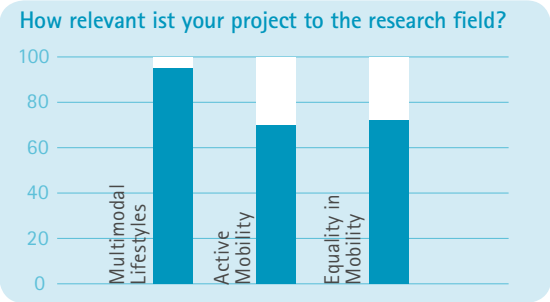



Figure: Relevance of project contents to the priority research and innovation areas (1= not relevant; 100 = very relevant); Source: Selfevaluation of the projects in terms of the project contents, research projects online questionnaire (n=95), November/December 2016, Brimatech, Netwiss, bmvit.

The practical relevance of the subsidized, topic-relevant research is evident in different implementation paths. An (at least partial) implementation of the project results already has been or is being confirmed for every other research project. 52 out of 95 project heads stated that the project outcomes will be or have been implemented in actual practice after the end of the project. Long implementation periods or the need for follow-up projects, lack of implementation partners, and inadequate implementation framework conditions (e.g., funding) are the main reasons why it has not been possible to implement the project outcomes in approx. a quarter of the projects thus far, or why it will not be possible to impement them in the future.

### Were the project outcomes implemented/will they be implemented in actual practice after the end of the project?

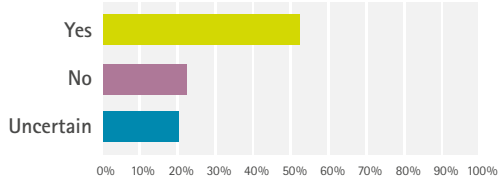
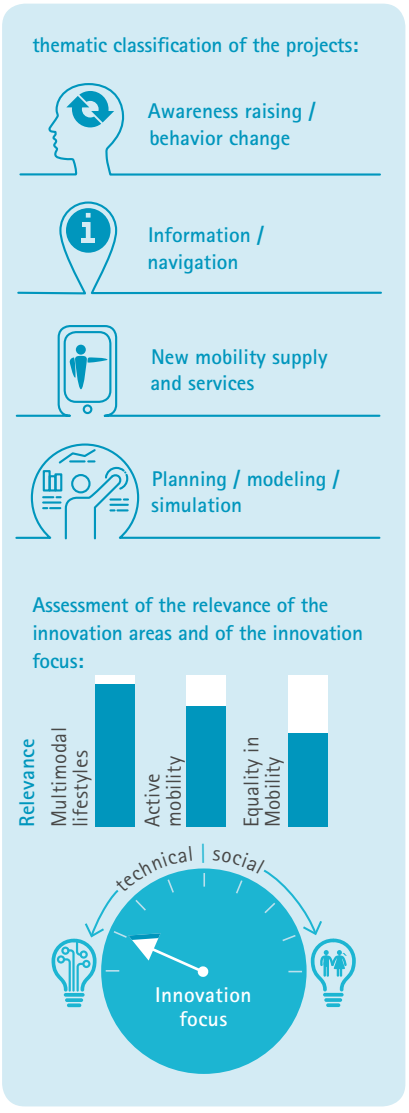



Figure: Implementation of the project outcomes after the end of the project? Source: Self-evaluation of the projects in terms of project contents, research projects online questionnaire (n=94), November/December 2016, Brimatech, Netwiss, bmvit.

An overview of all research projects and project fact sheets with the results of the already completed projects (including notes on implementations) can be found in the subsequent chapters of this publication. For this purpose, the projects were summarized in structured form according to funding instruments and initiatives and grouped according to four thematic categories. For characterizing the projects, their specific relevance to the three research areas and their innovation focus (emphasis on the technical area or social area of innovation) were also presented.[3]

In-depth summary analyses were performed for the "Personal mobility and social innovations" and "Personal mobility and intelligent transport systems" areas in order to shed more light on the program impacts.




3) Source: Self-evaluation of the projects in terms of project contents, Research projects online questionnaire, November/December 2016, Brimatech, Netwiss, bmvit.

# Personal Mobility and Social Innovations

## Why do we need social innovations in personal mobility?

System innovations – targeted in the personal mobility thematic field – are closely linked with social innovations. Two dimensions in particular should be highlighted:

- The **key challenges of the future** are **social questions,** starting with questions regarding energy consumption, climate change, demographic change, unemployment and social marginalization. In order to be able to respond to these challenges adequately, new solutions are required for infrastructure, living, workplace design, health care, education, etc.

- "Social" also relates to the **participative and networked processes,** without which innovations in a multiple stakeholder environment cannot be brought about. An essential prerequisite for new possibilities in light of the challenges is for different stakeholders to become actively engaged in the creation, implementation, and diffusion of innovations.

**As new social practices, "social innovations"** create better quality supply, reach new target groups, bring stakeholders together and build communities. They are thus able to contribute substantially to stimulating the transition to sustainable development, including in the mobility sector. "Social impact" is formulated as a RTI or mobility policy goal (e.g., overall transport plan for Austria) and is integrated in the "Mobility of the Future" program of the bmvit as a social application or potential application of technologies and innovations in the organizational and social context of the mobility system.

In order to bring about effects with regard to the two key topic-specific goals of the program (usability and accessibility of the transport system and sustainable forms and patterns of mobility) and stimulate the necessary behavioral changes for this, both technical and non-technical solutions in terms of new practices have to be addressed. Technological approaches alone often cannot bring about the intended effects, nor are they always conducive to initiating or effectively implementing innovative solutions in terms of the program goals (e.g., if the actual challenges are not in the technical area and if no added value can be expected from technical solutions). In the area of personal mobility, social innovations are therefore an essential component of the innovation portfolio.

**Social innovations** focus on novel social practices and non-technological solutions to problems in the mobility area. They fulfill a social need and lead to behavior changes in individuals or groups.

**Examples of social innovations in the research projects:**

- Sustainable mobility patterns are imparted to children through playful approaches (Virtual Pursuit Project)
- Awareness of and identification with public transport offerings arises through the cooperative designing of bus stop equipment elements (Project Biohalt)
- The breaking down of mental barriers or the overcoming of cultural constraints motivates migrants to ride bicycles (Project Migrad)
- New organization and coordination processes help parents in transporting children to and from kindergarten without cars (Project kids2move)
- Support for serving the mobilty needs of blind or handicapped persons as starting points for improvements in public transport for other user groups as well (Project ways4me)
- Incorporation of Sharing Mobility services in the planning and implementation of residential construction projects (Project Womo)
- Empowerment of communities for carsharing, from organisational to insurance solutions (Caruso Project Series)

## Types and importance of social innovations in the research projects

In each of the research projects, specific social needs or challenges are addressed that need to be covered or (partially) solved with the aid of the respective social inovation (e.g., social justice, common responsibility, local anchoring, lacking awareness of problems, foundations for target group-specific mobility). The research projects thus address a very broad spectrum of substantive goals relating to

- social innovation and equal opportunity,
- social innovation and inclusion,
- social innovation and affordability/cost reduction,
- social innovation through networking and establishing contacts,
- social innovation and entrepreneurial thinking (entrepreneurship)
- or research-driven method development.

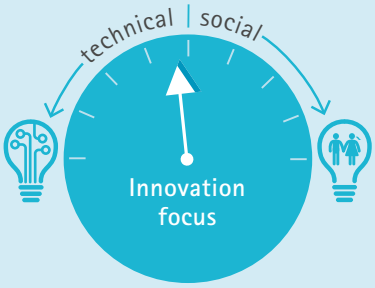
It is obvious that the intrinsic and idealistic motivation on the part of the project coordinators and participants is very high and that the projects very clearly define or characterize the respective social need for a specifictarget group. The community aspect of social innovation described in the preceding and which can also be identified in the literature is clearly reflected in the stakeholder configurations of the projects.[4]

The relevance of social innovations in personal mobility-oriented projects is weighted differently, depending on the topic. While topics such as "information/navigation" are more technically oriented by nature, research projects with topics in the "awareness raising/behavioral change" area primarily target social innovations or focus on combined solutions achieved through social and technical elements. Considering all research projects overall, technological and social innovation fractions are roughly equally weighted.[5]

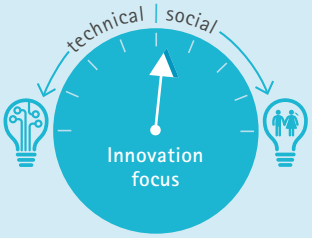
Social innovations often avail themselves of existing technology in order to make innovative use thereof, or they may employ technology in a targeted fashion in a particular configuration. Along with the systemic approach of the program, it is evident that the vast majority of the projects contain both technical and social innovation components. The transitions between them are frequently fluid and cannot be clearly differentiated, and it usually makes sense to pursue an integrated innovation focus. Only approx. one in 10 research projects in the thematic field places "its innovation" exclusively in the technical or in the social area.

The sought-after social innovations show potential for positive effects in terms of usability and accessibility of the transport system in the sense of inclusive mobility or sustainable mobility forms and patterns in the sense of active mobility. As new services and new system interactions, social innovations also support multimodal lifestyles. The expected positive effect in terms of fulfilling a social need for a given (usually under served) target group is a stated objective. These innovations address social problem situations of various target groups for whom positive effects such as quality improvements (comfort, life quality) or savings potentials (costs, emissions) are sought.[6]

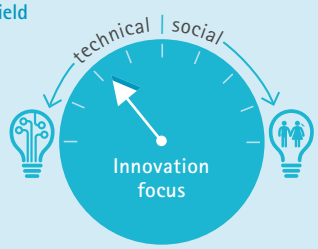
**Innovation focus of research projects overall** (hand all the way to the left: focus on technological innovation only; hand all the way to the right: focus on social innovation only)




**Innovation focus of research projects in the "Awareness raising / Behavioral change" thematic field**




**Innovation focus of research projects in the "Information/Navigation" thematic field**




4) Haindlmaier, Wagner, Kurzstudie SWING "Soziale Innovationen im Bereich Personenund Gütermobilität – Eine erste Bilanz", 2017.
5) Source: Self-assessment of project grant recipients, research projects online questionnaire November/December 2016, Brimatech, Netwiss, bmvit.
6) Haindlmaier, Wagner, Kurzstudie SWING "Soziale Innovationen im Bereich Personen und Gütermobilität – Eine erste Bilanz", 2017.

# Social Innovations and Implementation

An in-depth, quailtative study of selected research projects showed that there are very different phases of "maturation stages" in the program. Opportunities and challenges arise in the phase transitions.[7] A series of stumbing blocks can be seen, especially in the transition to implementation or value realization as well as in the further transition to growth or scaling. In terms of "systemic change" and improved "harnessing of value" of the results, there are still substantial barriers to overcome.
For example, effects that only produce results in the long term require the trust of decision makers, who frequently expect short term results. Despite high intrinsic motivation on the part of research stakeholders, because of their unique institutional logic the participating organizations cannot carry out an implementation (alone), and suitable framework conditions and responsible stakeholders are required throughout the project and beyond.[8]

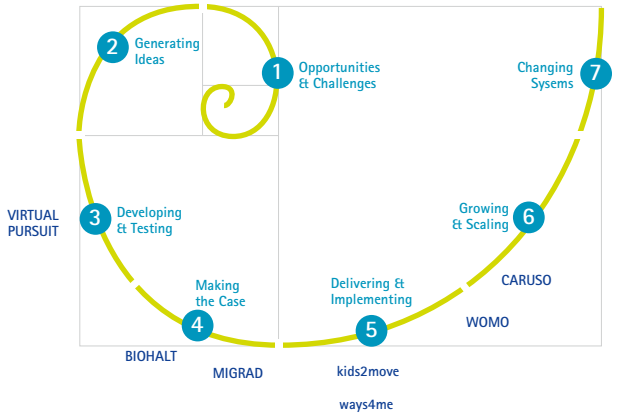



Figure: NESTA spiral model for classifying social innovations throughout the innovation cycle with examples of where selected research projects in the personal mobility area (blue text) fit in; source: NESTA with additions, Haindlmaier, Wagner, Kurzstudie SWING "Soziale Innovationen im Bereich Personen- und Gütermobilität – Eine erste Bilanz", 2017.

Traditional methodologies (e.g., TRL –Technology Readiness Level) have proven ineffective for estimating the "maturation stage" of social innovation. Successful social innovations often take place in a multistage process. There are various models for this in the literature. The often-cited NESTA spiral model of social innovation distinguishes among seven phases: At the beginning is the reason for a social innovation (opportunities and challenges; prompts), followed by the generation of ideas and proposals. Next come the first steps of implementation using prototypes (developing and testing; prototypes) or proof-of-concept (making the case; arguments). After these early phases, the emphasis shifts first to the delivery and implementation of, and then to the stabilization and scaling of social innovations. The ultimate goal of social innovation is systemic change.

## Quotes from project coordinators:

*"...in a manner of speaking, the outcome doesn't necessarily have to be the product that sells by the millions, what we really want is simply to achieve something for humankind."*

*"The solution must be local and must bring people together."*

*"I put myself in everyday situations and see how I can make mobility visible, recognizable, and attractive."*

*"To us it was very important to use technologies in places where they are also practical and have use potential."*

*"As we have seen in the last few years, a smartphone is a standard product that is being further developed and is consequently getting less expensive. With one, in a manner of speaking one can exert a positive influence on one's mobility behavior and should thus be able to solve this problem. [...] if we use it as the central device, we have viable options and we have tried to solve our problems with the options of a smartphone."*

7) Rameder, P. et al (2016): Der soziale Brutkasten: wie gesellschaftliche Innovationen besser gelingen. Wirtschaftsuniversität Wien, Sept. 2016.
8) Haindlmaier, Wagner, Kurzstudie SWING "Soziale Innovationen im Bereich Personen- und Gütermobilität – Eine erste Bilanz", 2017

# Personal Mobility and Intelligent Transport Systems

## Importance of intelligent transport systems (ITS) in personal mobility

Along with an attractive (public) transport infrastructure, information and communication constitute key factors of a modern, sustainable personal mobility system. Services, end user orientation, innovative mobility concepts and the individualization of services are challenges that can be dealt with by means of intelligent transport systems (ITS). Bringing about a substantial improvement of the service, efficient transport management, and high user equity in all transport modes, even across systems, requires ongoing technological further development. Standardization, platforms, and legislation are important bases for ensuring the efficient application of ITS services.

In this regard, a national strategy for implementing intelligent transport systems in Austria, which can serve as a foundation for user-oriented services, has already been created with the "Aktionsplan Intelligente Verkehrssysteme" [Intelligent Transport Systems Action Plan]. However, a successful implementation of intelligent transport systems requires a comprehensive approach. The developments and trends are pointing towards an integrated, multimodal transport system. A discernible goal here is to avoid isolated solutions and to find and implement cross-border, interoperable, large-scale and harmonized solutions instead. Innovative mobility concepts represent a key factor in this process, both in research and implementation.

In the European-wide comparison, the data bases (e.g., VAO and GIP) and the innovative services such as cooperative systems (e.g., C-ITS) that are already in place in Austria provide a sound basic framework for dealing with rapidly changing personal mobility needs and future demands. The Austrian funding programs have contributed decisely to this in past years.

**VAO**
(http://www.verkehrsauskunft.at/): Verkehrsauskunft Österreich (VAO) is a multimodal transport information platform for Austria. Its basic purpose is to optimize information searching and decision making for travelers, to increase transport safety, and to enable fair competition among the various transport modes. Several travel information services are now using the VAO as a database.

**GIP**
(http://www.gip.gv.at/gipat.html): The Graph Integration Platform (GIP) contains a multimodal traffic graph for Austria, which integrates and compiles all existing Austrian transport infrastructures. The collected data have also been available to the public as Open Government Data (OGD) since early 2016.

## Research in the area of intelligent transport systems (ITS)

The Mobility of the Future (*Mobilität der Zukunft*, MdZ) program supports ITS-relevant research projects in the personal mobility area which can be expected to contribute substantial solutions over the mid to long term to mobility-relevant social challenges and, through innovations, penetrate existing markets and/or generate new ones. To reach the goal of cooperation across borders and to achieve the supranatural harmonization of the existing systems, transnational projects are furthermore gaining in importance. During the 2014 to 2020 funding period, the European Union is creating incentives (Horizon 2020[1], for example) in several topic areas for research projects in the mobility area. In this regard, Austria has been responsibly involved in the ERA networks in past years, which shall henceforth be considered as a supplement to national initiatives (see p. 107 of this brochure).

ITS research funding prorities and subject matter of relevance to Austria shall be analyzed in national as well as transnational and international contexts in the following. Projects in the scope of Mobility of the Future as well as projects in the scope of the previous ways2go program line shall be discussed. The ERA networks shall also be considered by taking the trans- and international context into account.

In the scope of ways2go, 23 research projects were carried out within the specified five year timeframe. The end of 2010 marked the conclusion of the ways2go project series. In continuation, 27 research projects with ITS relevance (in the stricter sense) have been carried out to date within tendering periods in the scope of Mobility of the Future. On the basis of this analysis, both the present and future strategic positioning of Austria with regard to intelligent transport systems in personal mobility will also be described in the international context.

The ITS Action Plan, which was published in late 2011, is the national framework strategy for the implementation of intelligent transport systems in Austria. It is based on the EU ITS Action Plan and the EU ITS Directive. The basic motivation behind it is the establishment of a sustainable, safe and efficient transport system that incorporates modern telematic technologies. In 2014, additional connecting factors were defined with the publication of the updated list of measures. The ITS Action Plan defines six action fields:

1. Foundations
2. Transport management
3. Informed travelers
4. Goods transport and logistics
5. Vehicles
6. Novel mobility concepts

## Funding Priorities for ITS Projects in the Personal Mobility Thematic Field

The six action fields of the ITS Action Plan serve as a basis for classifying the projects according to funding priorities. The ITS Action Plan forms the long term implementation strategy for Austria and hence also constitutes the basis for ITS monitoring.

The funding priority in Austria underwent substantial changes in past years, as the following figure illustrates. In ways2go, the "Informed travelers" action field (Action Field 3) still accounted for a major portion (43 %) of the funding priority. In the scope of MdZ, however, there was an increasing shift of the priority towards research on "New Mobility Concepts" (Action Field 6), with a total of 30 % based on all three calls for proposals. Next came the "Informed travelers" action field (26 % of the funding cases). Establishing and researching foundations (Action Field 1) was also promoted (with a total of 19 % of the funding) somewhat more in MdZ. The "Goods transport and logistics" action field (Action Field 4) was also selectively addressed via the topic of luggage transport in personal mobility.

1) https://ec.europa.eu/programmes/horizon2020/

In some cases substantial differences in funding priorities can be discerned among the individual MdZ calls for proposals. For instance, in the 2nd call for proposals the focus was still mainly in the "Novel mobility concepts" (36 %) and "Informed travelers" (27%) areas, whereas in the 4th call for proposals, there was a greater emphasis on funding the "Foundations" (30%) and "Transport management" (23%) action fields. As a whole, considerably fewer ITS projects (three in number) were funded in the scope of the 6th call for proposals than in the 2nd (eleven projects) and 4th (13 projects) calls for proposals.

In terms of cooperations, there is a trend towards a smaller number of project partners (average number of project partners down from 4.2 to 3.0). In the ways2go projects that were examined, the average was still 4.7 partners per project.

Regarding transnational projects in the scope of the ERA networks, a total of eleven ITS-relevant projects in which Austria invested were carried out in the personal mobility area. The focus of the Austrian investment lay in the "Transport management" (36%) and "Informed travelers" (36%) action fields, followed by the "Novel mobility concepts" (27%) action field. In the foundations, mobility of goods and logistics, and vehicles action fields on the other hand, no ITSrelevant projects on personal mobility in which Austria invested were carried out in the scope of the ERA networks in the past few years. Regarding the ERA networks, there is a considerable degree of noticeable parallelism in funding priorities compared to the national funding priorities, except for the lack of basic research and the greater emphasis on transport management. However, as a whole the projects on the transnational level tend to be somewhat larger in scale, with an average of 4.3 partners per project.

An Austrian funding priority in personal mobility, with 34% in Action Field 3 (Informed travelers) followed by 25% in Action Field 6 (Novel mobility concepts), was evident across all programs (nationally as well as transnationally).

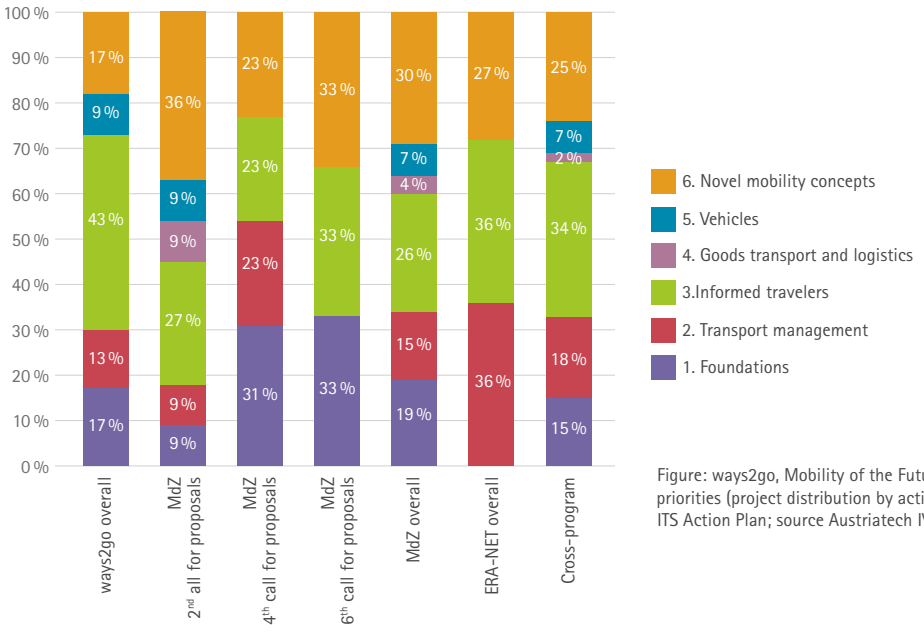



Figure: ways2go, Mobility of the Future and ERA-NET funding priorities (project distribution by action fields according to the ITS Action Plan; source Austriatech IVS Monitoring 2017.

On the national level, the thematic focuses of the MdZ projects lie mainly in the creation of framework conditions for an inter- and multimodal society as well as in the advancement of active and green mobility. Focus will be placed on the population growth and increasing volume of traffic in urban regions as well as on the demographic change in the rural sector. In this respect, the integration and development of novel mobility concepts, for example in the areas of Shared Mobility, E-Mobility and micro public transport are paramount. The aim of these measures is to establish the foundation for making up deficits and filling in gaps in the mobility chain (by prioritizing the "last mile" and inadequate public transport networks in rural regions, for example), with special emphasis on helping persons with limited mobility and who do not own cars.

The thematic focus in the transnational projects in the ERA networks lies more on the optimization of transport management and on the control of mobility behavior, particularly in terms of improving traffic safety and efficiency. This is to be achieved chiefly through the creation and development of new mobility services. Whereas the projects on the transnational level frequently target infrastructure operators, planners, and decision makers, in the national projects the emphasis is on the users (and especially on groups of persons with limited mobility).

While a clear overall trend towards technological or non-technological research cannot be discerned in ITS-relevant projects in the context of personal mobility, nevertheless a slight tendency towards non-technological research in terms of multimodal mobility is evident, with the transnational projects in the ERA networks tending to be somewhat more technical in nature than the nationally funded projects.

## Priorities of ITS Projects in the Personal Mobility Thematic field

The funding priorities elaborated in the preceding shall now be broken down according to their project contents and examined in more detail. Because they have been shown to be of little relevance as far as personal mobility funding is concerned, Action Fields 4 (Mobility of goods and logistics) and 5 (Vehicles) shall not be broken down specifically.

In Action Field 6 (New mobility concepts), the thematic priorities in the national projects were on systems/concepts for for serving mobility needs and also on sharing and pooling concepts. From a transnational standpoint, the focus was even more clearly on sharing and pooling concepts (67%), although cooperative intelligent transport (C-ITS) systems were also a key topic priority here (33%).

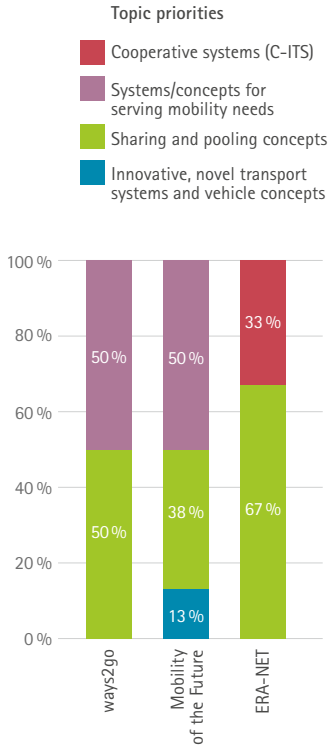
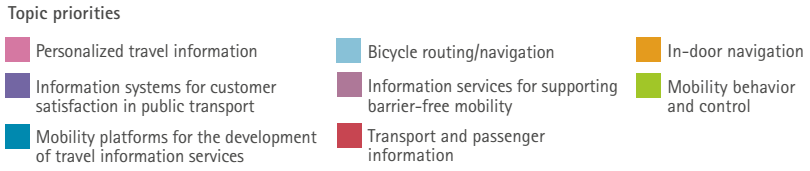



Figure: Thematic focuses of the projects of ways2go, MdZ and ERA-NET in Action Field 6 (Novel Mobility Concepts) according to the ITS Action Plan); source: Austriatech IVS Monitoring 2017.




From the national standpoint, there is clearly a development in the thematic focuses of Action Field 3 (Informed travelers). Although ways2go dealt with the topics in this area on a much larger scale, in MdZ increasingly greater focus was placed on the topic areas of information services for supporting barrier-free mobility (43 %), bicycle routing/navigation (29 %), and mobility behavior and control (29 %). In the ERA projects in which Austria invested, the thematic focus was likewise on information services for supporting barrier-free mobility (50 %), followed by the mobility behavior and control (25 %) and multimodal travel information (25 %) topic areas.

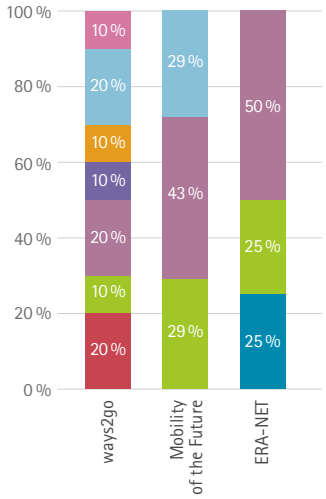



Figure: Thematic focuses of the projects of ways2go, MdZ and ERA-NET in Action Field 3 (Informed travelers) according to the ITS Action Plan); source: Austriatech IVS Monitoring 2017.


In Action Field 1 (Foundations), as already mentioned Austria did not invest in any of the projects related to ITS in personal mobility that were carried out on the transnational level in the ERA networks during the observation period. On the national level, however, the thematic focuses in this funding priority differ markedly in ways2go versus MdZ. Whereas the thematic focus lay on e-participation (50 %) in ways2go, research on data bases and new methods was by far the most important topic in MdZ (80 %).

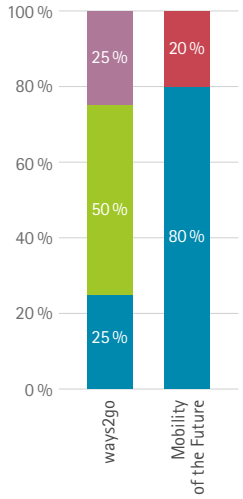



Figure: Thematic focuses of the projects of ways2go, MdZ and ERA-NET in Action Field 1 (Foundations) according to the ITS Action Plan); source: Austriatech IVS Monitoring 2017.


In Action Field 2 (Transport Management), a clear thematic focus on the management of corridors or transport networks is evident in the national (Austrian) projects in the scope of ways2go. The focus was also on management of infrastructure institutions in ways2go (33%), whereas in MdZ the focus shifted toward management of urban transport and mobility (50%). In the ERA projects, a clear thematic focus on infrastructure-specific themes, particularly on the management of infrastructure sections (75%), is evident in the Transport Management action field.

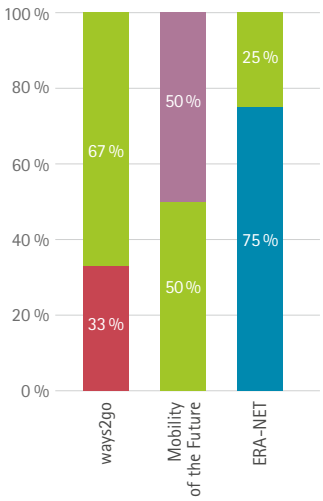



Figure: Thematic focuses of the projects of ways2go, MdZ and ERA-NET in Action Field 2 (Transport Management) according to the ITS Action Plan); source: Austriatech IVS Monitoring 2017.

## Current and future program-relevant framework conditions and developments for ITS in the personal mobility thematic field

The Horizon 2020 Initiative is addressing the changing framework conditions in the mobility sector on the European level. The projects in the ERA networks, which were also carried out with Austrian investments, area are making an important contribution here. ITS-specific research projects are also being funded on the transnational level through CEF Transport[2] funding instruments (trans-European networks) or through INTERREG[3]. The creation of uniform foundations and standards (e.g., for integrating and developing cooperative systems) through joint research and cooperation will contribute substantially to this.

On the Austrian (national) level, in addition to the Mobility of the Future research funding program presented in the preceding, ITS-relevant R&D projects are also being funded in the scope of the Transport Infrastructure Research (*Verkehrsinfrastrukturforschung* (VIF)) and the Austrian Competence Centers Program COMET.

In 2011, the ITS Action Plan (*IVS-Aktionsplan*) defined the strategic framework for an intelligent transport system for Austria. The updated 2014 List of Measures based thereon provided a further foundation. Legal framework conditions were defined in the IVS Gesetz [ITS Act], which went into effect in 2013.

In much broader terms than in the ITS Action Plan, the development priorities of mobility were defined in the Overall Transport Plan for Austria[4], which was published in 2012 and which establishes a framework for Austrian transport policy through the year 2025. In addition, the "Aktionsplan automatisiertes Fahren" [Automated Driving Action Plan] introduced in mid-2016 created a structured framework for developments in the area of automated driving. A suitable framework plan for cooperative systems was also developed in 2016, namely the C-ITS Strategy Austria[5]. With the ECo-AT[6] project and the concomitant creation of the Netherlands (Rotterdam), Germany (Frankfurt) and Austria (Vienna) Corridor, Austria has already assumed a pioneering role on the international level here as well.

The functioning collaboration of the different stakeholders is a key success factor in the implementation of ITS. In keeping with the ITS Act (*IVS-Gesetz*), AustriaTech GmbH was engaged as an ITS arbitration board in early 2014 in order to ensure both freedom from discrimination and a trouble-free business process. In addition, the ITS Austria platform enables active networking among the various stakeholders.

On the international level, the trend is generally towards uniform quality standards and the promotion of multi- and/or intermodality. Making access to public transport easier (E-ticketing, for example), the large-scale implementation of sharing concepts and the provision of an intermodal solution represent important efforts in this regard. With its efforts toward "Mobility-as-a-Service", Austria is already well-positioned in this respect.

The creation of a service-oriented mobility system is emphasized in the scope of the Mobility-as-a Service ("MaaS") concept. Intermodal cooperations and offerings, as well as the supply of an intermodal service, are key priorities here.

2) http://ec.europa.eu/inea/en/connecting-europe-facility/cef-transport
3) http://www.interregeurope.eu/
4) https://www.bmvit.gv.at/bmvit/verkehr/gesamtverkehr/gvp/downloads/gvp_gesamt.pdf
5) https://www.bmvit.gv.at/service/publikationen/verkehr/gesamtverkehr/downloads/citsstrategie.pdf
6) http://eco-at.info/home.html

Developments for cross-thematic approaches have been observed in recent years, which in turn have given rise to preliminary practical applications. With the establishment of the ÖVDAT association, there is now a legal structure for the provision of a large-scale, multimodal transport graph based on the Graph Integration Platform (GIP). Data have been published as Open Government Data (OGD) since 2016. The "Basemap" Project enabled the creation of a suitable base map for this.

Furthermore, the GIP-based Transport Information Service Austria (*Verkehrsauskunft Österreich,* (VAO)) provides comprehensive, multimodal transport information in real time. There are already a great many transport information services as well as research projects throughout Austria that are based on the VAO. With the debut of VAO 2 and VAO 2-E, the emphasis was placed on further expanding the integration of transport information, with the aim of achieving the objective of comprehensive and multimodal provision of transport information in real time.

When the VAO was put into permanent operation with permanent organizational structures, another major step towards large-scale and harmonized solutions – even beyond Austria – was taken. In terms of cross-border travel information services, in the "EDITS"[7] project a foundation was established for improving, updating, and harmonizing existing systems. As part of "CROCODILE", a common data base was created with the DATEX II format.

In conclusion, we can say that the conditions in the ITS area are very favorable in Austria. We expect that the trends in terms of implementing uniform quality standards and promoting multi- and intermodality will also be relevant in the future. The MdZ program provides an important "research substrate" for ITS in the personal mobility area and enables a transfer to social practice. In keeping with its transition claim, it furthermore enables system and behavioral changes through ITS. Project specific information (including information on ITS-relevant research initiatives) will be discussed in more detail in the following chapters of this brochure.

**Overview of ITS-relevant projects in the personal mobility thematic field (analysis basis):**

**Transnational projects**

| ACRONYM | Action Field |
|---|---|
| aim4it | 3 |
| COBRA | 6 * |
| ERASER | 2 * |
| Guide2Wear | 3 |
| net(t)ride | 6 |
| PEBAWI | 6 |
| PERRON | 3 |
| MobiHelfer | 3 * |
| QUATRA | 2 * |
| RAIDER | 2 * |
| SPACE | 2 * |

**Projects from the IV2Splus/ ways2go program line**

| ACRONYM | Action Field |
|---|---|
| Partizipationstool | 1 * |
| ways2talents | 1 |
| PROVAMO | 1 |
| Partizipationstool 2 | 1 |
| BIKENAVI | 3 |
| KoRa | 2 * |
| BikeWave | 3 |
| AVISO | 2 |
| FACTS4Stop | 6 |
| LEDs2go | 2 * |
| OpenTravelTimeMap | 3 * |
| BewusstMobil | 3 |
| Wetter-PROVET | 3 |
| BIS | 3 |
| Öffi-Feeback-App | 3 |
| ways4me | 3 |
| MOVING | 3 |
| MyITS | 3 * |
| TransitBuddy | 5 |
| FLEXICOACH | 5 |
| GIVE&GO | 6 |
| Caruso | 6 * |
| E-Caruso | 6 |

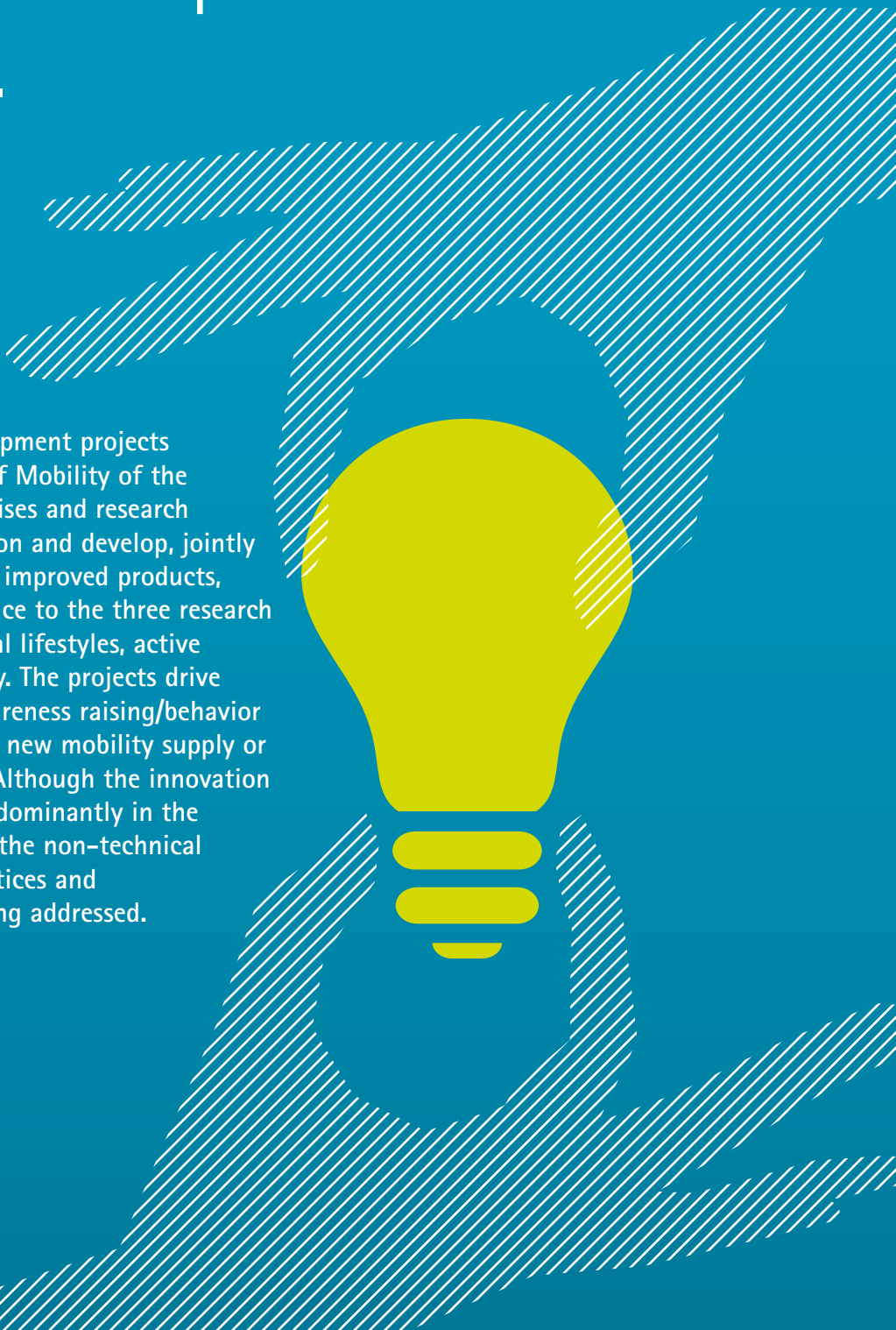
**Projects from the Mobility of the Future program**

| ACRONYM | Action Field |
|---|---|
| AVESTRA | 5 |
| ELISA | 6 |
| Gepäcklos | 4 |
| OPERMO | 1 |
| PlayMobi | 3 |
| PONS | 3 |
| SOMOBIL | 2 |
| SynArea | 6 |
| WOMO | 6 |
| MobilityEqualizer | 6 |
| Virtual Pursuit | 3 |
| flexiTrike | 3 |
| Mobility Trends | 1 |
| PlanBiss | 2 |
| RELAUT | 2 |
| ROPEWAY_POT | 6 |
| ShareWay | 6 |
| ways2see | 3 |
| LaneS | 2 * |
| MatchSIM | 2 |
| MobilityOptimizer | 6 |
| MULTIMOTIV | 1 |
| SHIQUE | 1 |
| ULTIMO | 1 |
| AALmobi | 3 |
| (R)adOmnes | 3 |
| MICHAEL | 6 |
| Shared Autonomy | 5 |

*) Project will not be discussed in this publication

7) Online at http://edits-project.eu/

# 3.
# Research. Development. Innovation.



Cooperative research and development projects respresent the key component of Mobility of the Future. In such projects, enterprises and research organizations conduct research on and develop, jointly with other partners, new and/or improved products, methods, and services of relevance to the three research and innovation fields multimodal lifestyles, active mobility and equality in mobility. The projects drive innovations in the topics of awareness raising/behavior change, information/navigation, new mobility supply or planning/modeling/simulation. Although the innovation focus of the projects can be predominantly in the technical area, it can also lie in the non-technical (social) area if novel social practices and organizational processes are being addressed.

AWARENESS RAISING / BEHAVIOR CHANGE

AKTIVE JUGEND

# Using mobile devices to promote active mobility of youth in city streets and open spaces

**In the AktivE Jugend project, methods of landscape planning, transport planning and sports science were combined. The idea was to use smartphones for assessing health-promoting active mobility of 15 to 17 year old Viennese students in an urban setting, for supplementing active mobility forms with fun digital accesses such as Geo-Caching and GPSDrawing, and for developing the "JAM – Jugend Aktiv Mobilcheck" analysis tool.**

Figure: *AktivE Jugend logo*

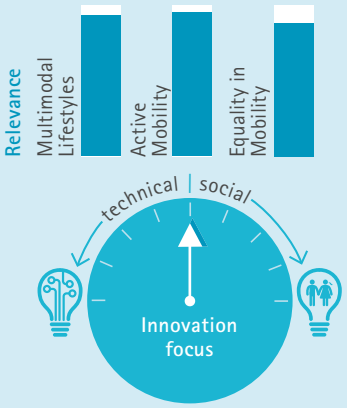
Young people are especially dependent on active mobility forms such as walking or bicycling and on open road spaces that are suitable for these activities. This health-promoting behavior is hardly encouraged at all in Austria. In the AktivE Jugend project, new findings on the quality of road speces and open spaces in connection with active mobility of students in Vienna were collected over a two year period with the aid of smartphone technology, specifically the tracking app Moves, accelerometers (which record movement intensity and numbers of steps), and analog activity log books. With the combination of sports science, landscape planning, and traffic planning methods, actively sought paths and places were cartographically visualized and analyzed with the students.

An attempt was also made to use Geo-Caching and GPS-Drawing as fun applications of mobile technology for encouraging active mobility. The behavior in terms of active, health-related mobility can be described with three types of movement – athletic youth, enthusiastically walking youth, or relaxed youth. The "JAM – Jugend Aktiv Mobilcheck" analysis tool was developed on the basis of this interdisciplinary mixed methods approach.

*"With mobile technologies and games, we want to make movement and active mobility visible and attractive to young people. This also includes reflection on the prerequisites for movement spaces. For when we look at movement profiles, we see that, in addition to the personal motivation of young people, heavily motorized transport and unnattractive walkways are the biggest hurdles that deter young people from walking and in particular from bicycling."*

Doris Damyanovic, project coordinator

## Characterization




## Impact

The interdisciplinarily developed method set raises awareness of one's own attitude, of one's own behavior, and enables reflection on the spatial conditions necessary for everyday movement with young people. Along with health and sustainability as impacts of active mobility, media and data protection skills in working with mobile technologies are also acquired with JAM.

## Implementation

JAM (Jugend Aktiv Mobilcheck) serves as a tool that enables young people to deal with the subject of walking and cycling in the city, as well as with their own mobility behavior and spatial requirements for movement and everyday mobility, in a targeted and fun manner.

**Contact:**
Ass.-Prof.in Dipl.-Ing.in Dr.in
Doris Damyanovic, Institut für Landschaftsplanung (ILAP)

**Partners:**
BOKU Wien – Institut für Landschaftsplanung (ILAP) and Institut für Landschaftsentwicklung, Erholungs- und Naturschutzplanung (ILEN),
Universität Wien – Institut für Sportwissenschaft,
komobile w7 GmbH – Büro für Verkehrsplanung

Project runtime: 10/2014 – 03/2017

**Research associates:**

AWARENESS RAISING / BEHAVIOR CHANGE

BEWUSSTMOBILE

# Awareness Raising Mobility Software for Children and Adolescents

**The goal of BewusstMobil was to use social media and serious games to promote age-appropriate, sustainable mobility behavior of children and adolescents, teach them about sustainable mobility, and stimulate the capacity to reflect on one's own mobility behavior.**

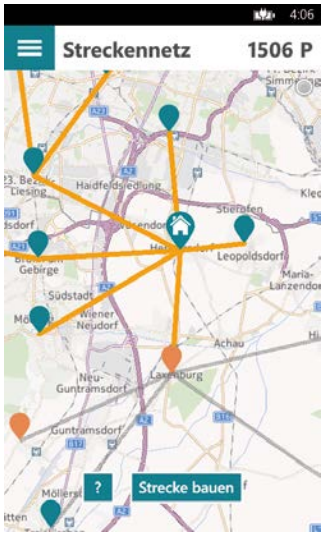



Figure: Screenshot of the BewusstMobil app, construction of a virtual route network

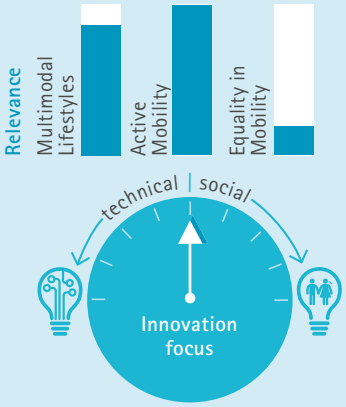
If the objective is to motivate as many people as possible to use sustainable and active forms of mobility, then as the saying "You can't teach an old dog new tricks" goes, it is necessary to instill the appropriate mobility behavior from childhood and adolescence on so that it becomes second nature.

Based on a list of requirements for children and adolescents that considered the life and media environments and areas of activity of children and adolescents in depth, an age-adequate topic matrix was developed in the project, which served as a foundation for instilling the desired forms of mobility behavior in a fun way. A key element of the project was the development of an app that not only measures the sustainability of selected mobility forms but also teaches about the topic area in a motivating manner. The more sustainable and the more active the form of mobility actually chosen is, the more points that can be won. These points can be used to build a virtual route network, wherein the goal is construct routes for reaching places with so-called events as quickly as possible, some of which have actual rewards as incentives. By being able to link with social media, interactive virtual competion for more sustainability is promoted. In a test phase with students, it was shown that young people, if given the right incentives, are willing to adapt their mobility behavior to the extent desired.

*"BewusstMobil demonstrates that employing awareness-raising applications in a fun and entertaining way instills the use of sustainable and active forms of mobility in children and adolescents and can actually change behavior. Behavior changes through the use of the app were noted in approx. 50 % of the test subjects."*

Daniel Schaller-Woda, CEO IT-eXperience

## Characterization




## Impact

After just a few weeks of the test phase, approx. half of the students stated that through using the app, they realized how important conscious mobility is in a modern society. Circa half of them also stated that while using the app, they changed their mobility behavior accordingly, at least to some extent.

## Implementation

The BewusstMobil app was developed and tested as a prototype for assessing not only technical feasibility in terms of critical issues such as reliable recognition of the choice of transport means, but also acceptance on the part of young people.

**Contact:**
Dr. Bernhard Rüger, netwiss OG

**Partners:**
ÖBB Personenverkehr Aktiengesellschaft, IT-eXperience Informationstechnologie GmbH, Fachhochschule St.Pölten ForschungsGmbH, Universität Wien - Institut für Bildungswissenschaft, Universität für Bodenkultur Wien - Institut für Verkehrswesen, Wortspiele

**Project runtime:** 08/2012 – 07/2014

**Research associates:**

AWARENESS RAISING / BEHAVIOR CHANGE

PLAYMOBI

# Changing mobility behavior in a fun and smart way

**"PlayMobi" is an integrative game concept (=Traces), which shows the diversity of individual mobility options and motivates players to voluntarily adopt smart modes of mobility.**


Figure: "Traces" screenshot with different routes

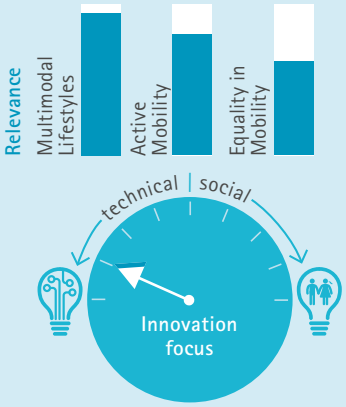
The urban app game "Traces" links mechanisms of a serious game to location-based gamification elements, integrates state-of-theart technologies (e.g., smartphone sensor technology, NFC, Geofencing) and is based on sound behavior modification theories (eg., MAX self-control model, Flow Theory, FOGG model).

The project goal was to promote the smart mobility of persons in a fun manner. The urban app game "Traces" endeavors to break up individual mobility routines through a positive game experience in which the player, depending on his/her past transport mode preferences, systematically brings new, smart mobility alternatives "into play". "Make gray Vienna more colorful" is the motto of "Traces", which links the real world to the virtual world and creates a common goal: As soon as the players use smart transport means, they leave colorful tracks (=traces) for all to see on a gray map of the city (see figure). The more this happens, the more colorful the city becomes.

*"'Traces' builds upon on a set of fun interventions, narration, and game mechanics, which not only enable smart mobility to be experienced individually, but also create a collective image of a colorful city. This motivates the players to question outmoded routines of selecting transport means and to try something new, thus demonstrably changing attitudes toward alternative, smart modes."*

Univ. Prof. Dr. Martin Berger (yverkehrsplanung GmbH)

## Characterization




## Impact

"Traces" is great fun for the test players and changes their personal attitudes toward smart transport means in a positive manner, as the results of a comprehensive assessment of the game campaign clearly show.

## Implementation

"Traces" was tested and critically examined in the scope of a 2 week game campaign in Vienna. The overall concept of "Traces" is based on campaign, narration, and game mechanics and is coherent in and of itself. It functions as an artefact in the application practice. It was furthermore possible to identify behavior-related and cognitive effects in terms of more smart mobility in the participants.

**Contact:**
Univ. Prof. Dipl.-Ing Dr.-Ing Martin Berger, yverkehrsplanung GmbH

**Partners:**
Donau-Universität Krems - Zentrum für angewandte Spieleforschung,
MOPIUS OG,
Cows in Jackets - Agentur für unkonventionelle Kommunikation e.U.,
evolaris next level GmbH

**Project runtime:** 05/2014 – 04/2016

**Research associates:**

AWARENESS RAISING / BEHAVIOR CHANGE

PRO:MOTION

# Sustainable mobility with technologybased solutions through target group orientation and motivation

**In pro:motion, methods of social science were used to identify target groups who are capable of being motivated to active mobility by specific arguments (e.g., prestige, costs, health) via specific information channels (e.g., mobile apps, printed media, peers). This permits the development of targeted communication strategies and a higher acceptance of measures employed.**

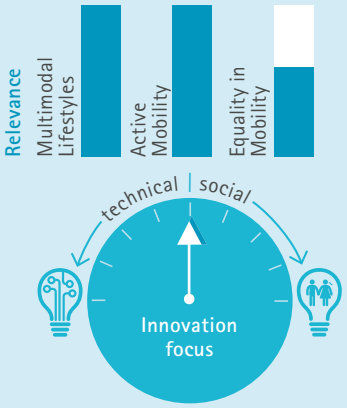
Promoting forms of active mobility is of great importance, not only for sustainability reasons but also in terms of social challenges (health, life quality). However, the achievement of these goals often fails due to lack of knowledge of possible and suitable measures or to lack of acceptance. In order to develop potentials that have remained untapped thus far and to make forms of active mobility more attractive, it is not only necessary to create suitable information services and offerings but also to use suitable incentives and motivators to spark interest in these offerings and to motivate towards behavior changes.

In pro:motion, the priority was to investigate and categorize the diverse behavior and attitude patterns of users of mobility information. This made it possible to identify social groups with homogeneous information needs. Social environments (daily existence worlds, attitudes, preferences, aversions, habits or constraints) rather than traditional approaches (e.g., gender, age) were used as a basis for classifying potential users. These were generated using qualitativeinterpretive methods and processed using quantitative-statistical methods so as to represent Austria. The types of communication needs and the associated communication strategies that were identified are used to develop target group-oriented measures that motivate towards active mobility in a precisely targeted manner.

*"Active mobility motivation measures are not equally well-suited for all social groups and must therefore be oriented to the value concepts and preferred information channels of the target groups. In the pro:motion project, a sophisticated blend of qualitative and quantitative methods was used to identify target groups who can be described as representative of Austria on the basis of their willingness to change, their attitudes, and their regional distribution. With the aid of these six types of communication needs, concrete communication strategies can now be developed by choosing the right arguments and information channels, and the potential success of a measure can be better assessed."*

DI Dr. Alexandra Millonig, AIT Austrian Institute of Technology GmbH

## Characterization




## Impact

Users have had few options thus far for realistically assessing the impact of measures on the motivation of specific target groups towards active mobility. With the results of pro:motion, for the first time a comprehensive, readily accessible processing of representative target groups is available for motivation strategies in the mobility area, which can be used to develop effective measures in an efficient manner.

## Implementation

The results of the project will be provided via a homepage and will thus be available for elaborating target group-specific communication strategies.

**Contact:**
DI Dr. Alexandra Millonig,
AIT Austrian Institute of Technology GmbH

**Partners:**
Technische Universität Wien, Department für Raumplanung, Fachbereich Soziologie,
Herry Consult GmbH,
Sensor Marktforschung Ges.m.b.H.,
INTEGRAL Markt- und Meinungsforschungsges.m.b.H.

**Project runtime:** 05/2014 – 08/2016

**Research associates:**

AWARENESS RAISING / BEHAVIOR CHANGE

VIRTUAL PURSUIT

# Motivation to change mobility behavior by gamifying the presentation of route alternatives

**The potentials of different game variants for motivating the players to familiarize themselves with mobility alternatives, to break routines and develop muultimodal lifestyles were examined in the Virtual Pursuit project.**

The use of game mechanics to motivate changes in behavior (e.g., gamification approaches or serious games) is now deemed a successful means of encouraging desired behaviors. Although there are also numerous examples of this in mobility, the long-term impact on attitudes or behaviors regarding mobility has hardly been researched at all. Virtual Pursuit set itself the goal of investigating the potentials of mobility-related game concepts for raising awareness of new route and transport alternatives and for motivating changes in behavior.

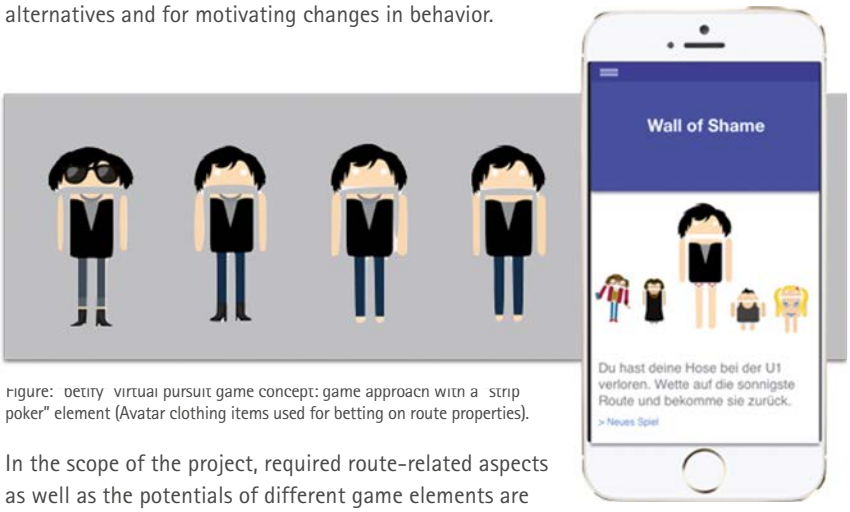


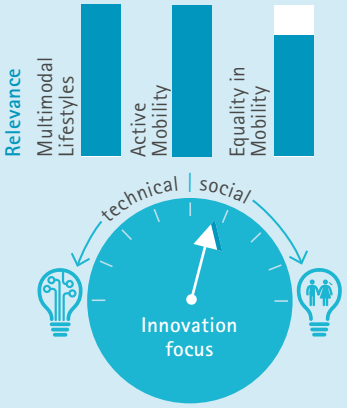

Figure: "Betify" virtual pursuit game concept: game approach with a "strip poker" element (Avatar clothing items used for betting on route properties).

In the scope of the project, required route-related aspects as well as the potentials of different game elements are examined and continuously tested with selected potential user groups using interdisciplinary methods. The results are in the form of two game concepts (trading card game with companion app and smartphone game) as well as a game design (board game), which are oriented toward different target groups. The results were discussed with potential users in order to reveal potentials for implementation.

*"Mobility decisions are seldom based on rational considerations. Instead they are characterized by emotional factors such as experiences, reservations, or habits. Games and game elements have great potential for increasing the emotional value of multimodal behavior. In Virtual Pursuit, it was possible to investigate these potentials for three different game approaches. Key prerequisites for the success of game elements in changing mobility behavior could thus be identified."*

DI Dr. Alexandra Millonig, AIT Austrian Institute of Technology GmbH

## Characterization




## Impact

The evaluation results confirm that game elements can be used to raise awareness of and spark interest in alternatives. Serious games are particularly well-suited for this because they are not primarily centered on mobility and can thus attract other groups to whom mobility issues are not of primary interest.

## Implementation

Findings from this project have already been implemented in other projects for creating route alternatives and for selecting target group-appropriate game mechanics. In a user workshop, the project findings were discussed with potential implementers and potential follow-up projects were identified.

**Contact:**
DI Dr. Alexandra Millonig,
AIT Austrian Institute of Technology GmbH

**Partners:**
ovos Media GmbH,
Fluidtime Data Services GmbH

**Project runtime:** 04/2014 – 04/2016

**Research associates:**

INFORMATION / NAVIGATION

AIM4IT

# Accessible and inclusive mobility for all with individual travel assistance

**The project focused on an inclusive and fair use of the public transport system for all social groups. The project followed a holistic approach, which comprises not only the viewpoint of the users but also that of the service providers and thus enables full and unrestricted use of public transport over the entire mobility chain.**

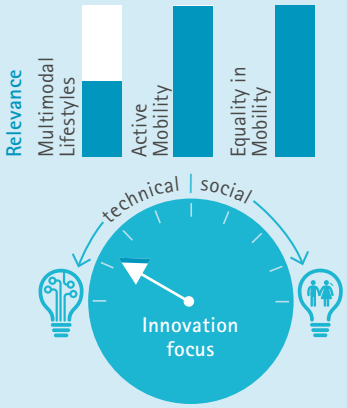
Every mobility chain is accompanied by an information chain. Handicapped passengers in particular need to get information of relevance to themselves on departure and transfer times in a timely fashion. This information must be available in an up-to-date and understandable form at key stations along the route. Essential information must be conveyed in visual, acoustic, and/or in haptic form, but at least according to the two senses principle.

The aim4it project took on this task and united the skills of its partners around promoting a novel On-Pri-Postrip information system for the regional public transport system, which comprises the provision of information (in sign language) for deaf passengers, for blind passengers, and also for other groups such as wheelchair users. The fact that handicapped passengers need longer transfer times was also taken into account in order to ensure that they do not miss their connections.

Using Wiener Linien as an example, the entire alert message system was evaluated in the project. The provision of alert messages on all channels simultaneously was improved and streamlined in order to provide passengers with largely standardized alert messages in real time. As a novelty, during the project runtime it became possible to generate alert messages as "Text2Avatars", which provided deaf persons with appropriate information on their smartphones.


Figure: Alert message as a Text2Avatar on a smartphone

## Characterization




## Impact

The users tested the new technological options in an impressive manner and were pleased with the system. There is a great and urgent demand for an implementation in existing systems. It was furthermore possible to make the the different user groups aware of the technical, human resource, and financial challenges.


Figure: Alert message as a Text2Avatar on a smartphone

It was furthermore possible to test a connection assurance for buses and to improve the communication with the public transport vehicle by using WLAN and BLE. In the concluding demonstration, different user groups (blind, wheelchair users, deaf) were able to select and save their mobility profiles on a mobility app. During the route finding process, these persons were individually guided and, in the event of a malfunction, failure, etc., informed in different ways. The alert report then provided rerouting results for the same destination, also on an individual basis (i.e. wheelchair users received transfer information based on available elevators in the stations; appropriate information for deaf persons was displayed as Text2Avatars).

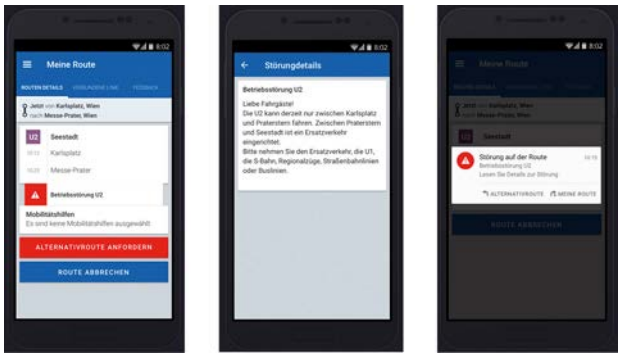



Figure: Example of an alert message in the smartphone app

In the event of a delay or rail replacement, a connection to the public transport bus was assured on an idividual basis (wheelchair users and blind persons need more time to change!).

*"The mobility of handicapped persons demands new solution approaches, which also make improvements possible for all other user groups. Specific needs not only sharpen awareness of the problems, but also open up new solution spaces that contribute to an inclusive and attractive public transport system."*

DI FH Werner Bischof, FH-JOANNEUM GmbH

## Implementation

A stretch between Karlsplatz and Messe-Prater in Vienna was used for testing. The project also comprised an implementation and expansion of the VDV 431 Trias Standard. There was also a presentation of the results at the ITTrans trade fair in Karlsruhe 2016 and a concluding event at the Remise Wien transport museum in May 2016. Further results include numerous national and international publications, as well as a presentation of the project results as a youtube video.

**Contact:**
DI Werner Bischof,
FH JOANNEUM Gesellschaft mbH

**Partners:**
FH JOANNEUM Gesellschaft mbH,
FLUIDTIME Data Services GmbH,
Mentz Datenverarbeitung Austria GmbH,
Mentz Datenverarbeitung Deutschland GmbH,
Wiener Linien GmbH & Co KG,
Matrixx IT-Services Ges.m.b.H.,
Sign Time GmbH,
DLR Deutsches Zentrum für Luft und Raumfahrt (Braunschweig, Bereich AIM),
Init AG,
Bergische Universität Wuppertal,
Poznan Universität of Technology

**Project runtime:** 09/2014 – 06/2016

**Research associates:**

INFORMATION / NAVIGATION

AALMOBI

# The Integrated Mobility Service for Ambient Assisted Living

**In AALmobi, a modularly expandable and integrated mobility service in the form of a Tablet app is being experimentally developed. It enables people in ambient assisted living to use the mobility service actively.**

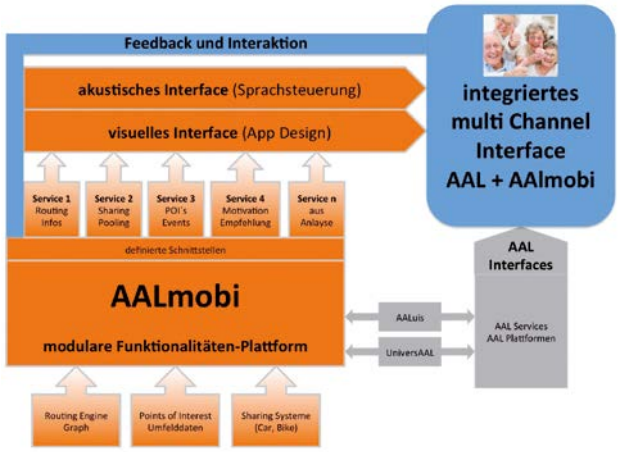



Figure: Modular Project Structure

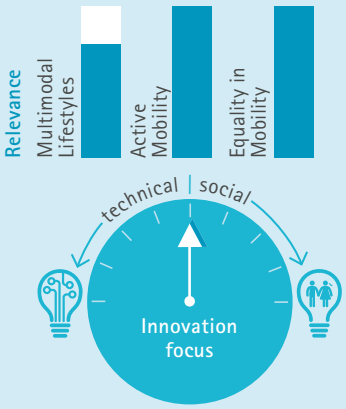
The project goal of AALmobi consisted of the successful implementation of a prototype Tablet app, with which people in ambient assisted living can manage their daily active mobility for as long as possible. AALmobi should therefore have minimal use barriers, motivate users to go out and network with one another, and encourage them to support one another. Compatibility with as many ambient and AAL applications (which in most cases are only available for the immediate living space) as possible, as well as research on both visual and acoustic interaction possibilities, were also prioritized in the developments.

From a technology standpoint, AALmobi is based upon the 100 Gründe, vAssist AALuis and UniversAAL research projects and therefore integrates numerous functionalities, findings, interfaces, and standards in a modular functionalities platform that is capable of being expanded at any time. The AALmobi prototype with the name "WAALDI" was evaluated in collaboration with residents of the OASE 22 AAL project in the 22nd District of Vienna, which is managed by the LOI partner Caritas.

*"Once we received FFG funding, in the AALmobi project we were able to implement an extensive participation process in cooperation with the OASE22 residents and together we succeeded in creating the WAALDI Tablet app."*

DI Klaus Heimbuchner, heimbuchner consulting GmbH

## Characterization




## Impact

The prototype app "WAALDI" developed in the scope of AALmobi was very popular with the test persons involved, even during the evaluation phase. On the one hand their active mobility was intensified through the use of the app, and on the other hand the consortium partners gained vluable information. During the dissemination phase, AALmobi was met with widespread interest among experts and stakeholders, who became involved in the project during workshops.

## Implementation

Along with an extensive growth in know-how for the consortium partners, the most significant outcome of AALmobi is the functional protoype of a Tablet app, which was advertised under the name "WAALDI". Even though the project is over, WAALDI is available as a demonstrator (www.WAALDI.at).

**Contact:**
DI Klaus Heimbuchner,
heimbuchner consulting GmbH

**Partners:**
PlanSinn GmbH - Büro für Planung und Kommunikation,
PL.O.T EDV-Planungs- und Handels GmbH,
Caritas der Erzdiözese Wien (LOI Partner für Testumgebung und Evaluierung)

**Project runtime:** 05/2015 – 10/2016

**Research associates:**

INFORMATION / NAVIGATION

BIKENAVI

# The Intermodal and Interactive Open Platform Navigation for Cyclists

**With Bikenavi, the prototype of an innovative navigation service for cyclists was developed as a smartphone app and tested in the pilot area of Vienna. Intermodal INTEGRATION, the SYNERGY of administrative data and open source data, and also PARTICIPATION in development and operation (user generated content, crowd sourcing) were achieved for the very first time.**

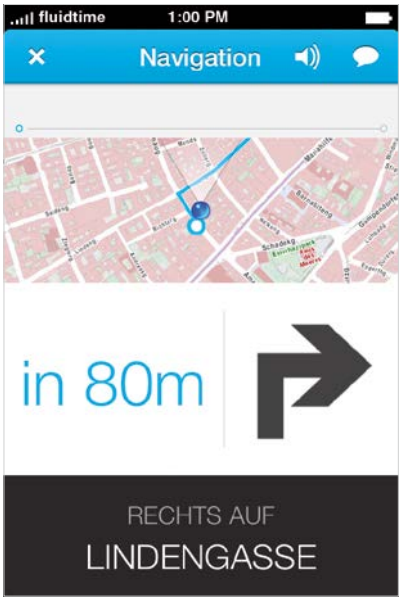



Figure: Bikenavi navigation suggestion screenshot

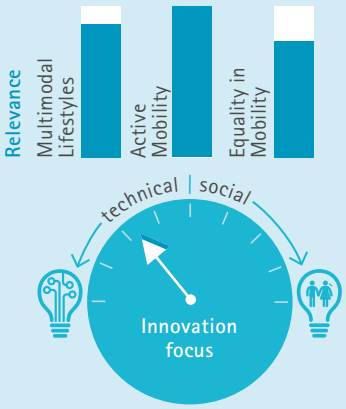
The goal of the project was to design and develop, in a participative manner, an innovative navigation service as a smartphone app specifically for cyclists, and to test the prototype in the pilot area of Vienna. A suitable database was made available through the inclusion of the City of Vienna, a mobility agency, and ITS Vienna Region. The companies Toursprung, Fluidtime and PlanSinn contributed their extensive know-how in user interface design, ITS services, user generated content (Bikemap.net) and participative development.

The innovation of Bikenavi lay in the researching of new possibilities and individually relevant demands of cyclists in the transport system (e.g., cycling against the one way direction, optimized user interface, intermodal connections, ...). These aspects are either not addressed at all or only marginally by standard navigation services, which are primarily geared to motorized private transport and on which good quality data is also lacking.

*"Bikenavi was an outstanding project for gaining an understanding of the unique service and usability requirements of cyclists and for implementing them in a prototype."*

DI Hans Fiby, ITS Vienna Region

## Characterization




## Impact

ITS Vienna Region was subsequently able to integrate the comprehensive findings from the participative project development as well as numerous technological innovations of the Bikenavi prototype directly into the optimization of the AnachB transport service. The project partners (bikemap.at, AnachB.VOR.at, services of the City of Vienna's Mobility Agency for cyclists and pedestrians) were likewise able to use valuable information of usability in their developments. Bikenavi thus had a substantial qualitative impact on the further activity of the project partners.

## Implementation

The Bikenavi findings were incorporated directly into the further development of the project partners' services (see "Impacts").

**Contact:**
DI Hans Fiby, ITS Vienna Region

**Partners:**
Mobilitätsagentur Wien GmbH,
Toursprung GmbH,
PlanSinn Büro für Planung und Kommunikation GmbH,
FLUIDTIME Data Services GmbH

**Project runtime:** 05/2012 – 10/2013

**Research associates:**

INFORMATION / NAVIGATION

BIKEWAVE

# Green light for cyclists via selflearning routing and assistants on smartphones.

**The BikeWave project had the task of solving the problem of waiting times for cyclists in the urban area caused by traffic light systems (VSLA), which are optimized for motorized private transport. This task was accomplished with a smartphone app for bicycle navigation, which by analyzing GPS movement trajectories, continuously recognizes and learns the traffic light systems and their signal programs.**


Figure: Screenshot of the BikeCityGuide app with GreenWave Buddy activated

Waiting times caused by traffic lights that are optimized for motor vehicle traffic cost cyclist in urban areas a great deal of time and energy. The BikeWave project solves this problem with the aid of a smartphone app for bicycle navigation.

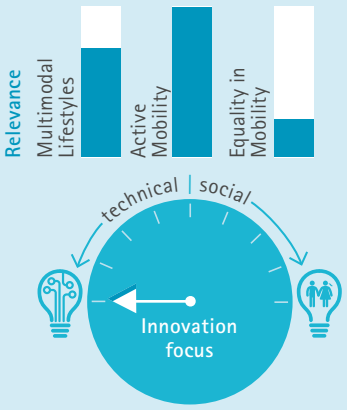
In BikeWave, this innovation was designed for cyclists, but it is also applicable to other transport modes. Lastly, the GreenWaveBuddy implemented in the bicycle navigation app BikeCity-Guide, gives cyclists recommendations on cycling speeds during the rides in order to minimalize stops at traffic lights.

To this end, in the scope of the project methods were created for estimating round trip times and green times on the basis of GPS trajectories of cyclists, and routine algorithms were developed that factor in traffic light cycles and several optimization criteria (e.g., time and comfort). These methods have already made it possible to recognize more than 500 signal patterns from 40,000 GPS trajectories in the Vienna area. It was proven that signal patterns from traffic lights can also be detected in a limited data set of GPS trajectories. Dynamic traffic control (via public transport priority schemes, for example) is less detrimental to the results than assumed. Challenges lie in reliably finding the stop positions and the end of the green times. Routine algorithms for integrating the signal patterns and for generating alternative routes were successfully implemented.

*"The 'GreenWaveBuddy' is technologically feasible, that we have proven. In my opinion it is the most exciting application to date to come from crowd based cycling data."*

DI (FH) Robert Schönauer, mobimera Fairkehrstechnologien KG

## Characterization




## Impact

De researched algorithms have refined the methods of analyzing the GPS tracks of cyclists to the extent that Bike Citizens and AIT are now offering tools for evaluating planning measures and for depicting traffic flows. mobimera also analyzed bicycle data in the scope of a foreign traffic planning project. Integration in the published versions of Bike Citizens has not taken place. It is not possible to give a direct presentation in economic indicators. A total of seven publications/presentations have come out of the project.

## Implementation

Data analysis of GPS tracks has been implemented in several Austrian provinces.

**Contact:**
DI (FH) Robert Schönauer,
mobimera Fairkehrstechnologien KG

**Partners:**
AIT Austrian Institute of Technology GmbH,
Bike Citizens GmbH

**Project runtime:** 10/2012 – 09/2014

**Research associates:**

INFORMATION / NAVIGATION

BIS
# Barrier Information System

**The objective of the "BIS – Barrier Information System" project was that of designing a powerful routing software for people with limited mobility, for whom getting around in the city is either difficult or impossible because of barriers.**

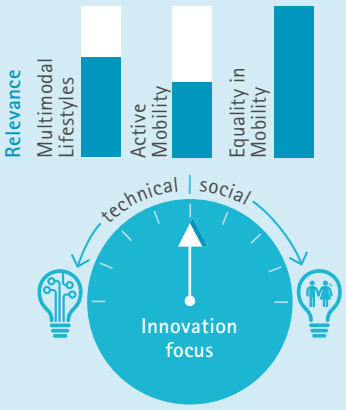
Barrier-free routing is an especially important instrument for improving the ability of persons with limited mobility to participate in society. However, owing to the deficiency of available data there has never been a satisfactory barrier-free routing system successfully operating anywhere in Europe thus far. In the "BIS – Barrier Information System" project, an interactive route planning tool for wheelchair users was developed in exchanges among user groups, technology experts, and stakeholders (politics and administration). This tool uses government data and community data in a synergistic manner, provides it in a clearly understandable form, and by means of a powerful routing software, uses it to calculate the most suitable "ways2go" for wheelchair users. The route planning results are available in digital form, or they can be accessed in a simple printed version.

Figure: The experts in the cooperative research process – wheelchair users and their companions were involved in the analysis of requirements, development and testung of BIS.

*"Critical information at the right place is an essential key to social participation and self-determined mobility. Wheelchair users are always encountering barriers along the way. The only way out is often a detour or turning around. What if all necessary information about routes in the city were available? How much simpler would it be for people to move about? How much more independence would that bring? BIS has shown that the complex volume of data can be translated into a route recommendation that is provided in a manner as individualized and precise as necessary, yet as simple and as compact as possible. One of the remaining challenges is to fill gaps in the databases and keep them up to date - the public authorities are definitely needed here."*

Dlin Efa Doringer

## Characterization




## Impact

The final key feedback from the wheelchair user community was essentially that such info could make things considerably easier for all wheelchair users.

## Implementation

The findings from the participative development are gradually being integrated in the routing of the ITS Vienna Region/ VOR Verkehrsverbund Ost-Region. In the scope of BIS, among other things road routing was identified as a central feature of a route description that is oriented to people with limited mobility.

**Contact:**
DI Johannes Posch, PlanSinn Büro für Planung und Kommunikation GmbH

**Partners:**
Prisma solutions EDV-Dienstleistungen GmbH,
ovos media consulting gmbh,
Sonja Gruber – Sozialwissenschaftliche Begleitforschung,
Heinrich Hoffer – Sozialforschung zu Alter und Behinderung,
ITS Vienna Region / Verkehrsverbund Ost-Region (VOR) Ges.m.b.H.,
Medizinische Universität Wien - Universitätsklinik für Neurologie

**Project runtime:** 07/2012 – 06/2014

**Research associates:**

INFORMATION / NAVIGATION

GUIDE2WEAR

# Public transport services with wearable devices for different mobility types

## A detailed analysis of user needs was used as a basis for developing and testing the prototype of an intermodal navigation app for a smartwatch.

Figure: Guide2Wear Smartwatch application

The goal of the Guide2Wear project was that of developing a prototype of a navigation app for a smartwatch that makes intermodal mobility easier (Guide2Wear prototype). The project was structured in line with the finding that technical solutions in the mobility area fail if they do not take user needs, requirements, and demands into account. Accordingly, the specification of a smartwatch as a platform, the selection of a navigation function, and the concrete design thereof are based on qualitative methods, with potential users included in the process. These needs, requirements, and demands were ascertained in a structured manner in focus groups and expert workshops.

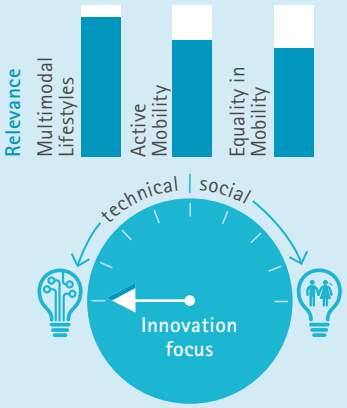
The impacts of the WienMobil-Karte, an intermodal mobility card with which public transport means, sharing systems, and other services related to mobility can be used, were also examined in order analyze these requirements. To this end, use was made of a before-after control group design with several surveys and smartphone-based measurements of mobility behavior. It was confirmed that by including public transport means, the WienMobil-Karte encourages intermodal mobility behavior.

The Guide2Wear prototype was field tested for manageability, usefulness, user acceptance, and possible impacts on mobility behavior. In the scope of the test, test users traveled various routes in the Wiener Linien network with the aid of a smartwatch. The prototype received positive ratings in terms of manageability and usefulness. Regarding user acceptance, it turned out that the smartwatch does not have a unique selling point at the present time. Behavioral effects can be expected, especially in terms of unfamiliar routes and using public transport means.

*"Mobility is not an end in itself. Instead it is a basic requirement for enabling people to avail themselves of various opportunities (employment, vacationing, social contacts, education, etc.). Accordingly, the goal must be that of assuring a rapid, efficient, affordable, comfortable, and 'green' mobility service. Both study objects of the Guide2Wear project, namely the WienMobil-Karte intermodal mobility card and the prototype navigation app for a smartwatch, can contribute to this by simplifying access to information and to ('green') transport means."*


Christoph Link, Institut für Verkehrswesen, BOKU Wien

## Characterization




## Impact

The findings obtained in the project on the impacts of a mobility card, on smartwatches, and on other wearable devices in terms of their user acceptance and suitability for mobile applications, as well as the findings relating specifically to smartwatchbased navigation apps, made a significant contribution to the state of the art. From a methodical viewpoint, this likewise applies to the beforeafter control group study on the impacts of the WienMobil-Karte. Comparative studies in this clear-cut form have very rarely been implemented in the mobility area. Although the contribution to assuring sustainable mobility cannot be quantified, it no doubt exists.

## Implementation

The Dresdener Verkehrsbetriebe AG (DVB) is planning to integrate the Guide2Wear prototype in its information service. Scientific and practice-oriented follow-up projects are in the planning stages.

**Contact:**
DI Christoph Link,
Institut für Verkehrswesen, BOKU Wien

**Partner:**
FACTUM Chaloupka & Risser OG

**Project runtime:** 09/2014 – 08/2016

**Research associates:**

INFORMATION / NAVIGATION

MOVING

# Methods for optimizing indoor guidance and navigation systems

**The goal of the MOVING project was that of developing a new method for evaluating control systems and navigation solutions in large infrastructures. To this end, the DAVE (Definitely Affordable Virtual Environment) of the Technical University of Graz and Frauenhofer Austria was upgraded with eye tracking and constructed as an innovative test and analysis environment.**

The integration of the eye tracking system in the virtual environment not only makes a new dimension of data capture possible, but through semi-automatic view analyses, also enables a ground-breaking improvement and efficiency increase in the evaluation of eye tracking data. The calculations of the intersection points of the lines of sight with the 3D environment permit an automatic identification of the observed objects, and they can be displayed in the 3D model in the form of point clouds. By depicting "attention" in this manner, it is possible to wander through the visual infrastructure in an explorative manner and test the perception of distinctive landmarks and guide elements.

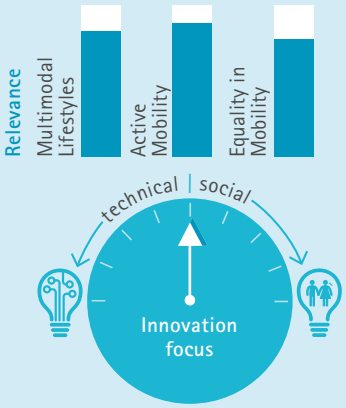
Figure: Test subject equipped with eye tracking in the virtual environment

By integrating the recorded movement data, thinking aloud comments, observations and surveys of the test subjects, a detailed evaluation of the guidance system can be performed and targeted recommendations can be developed for adapting the guidance system. At the end of the R&D project MOVING, a fully functional virtual test environment will be available. It will enable alternative information supply scenarios to be tested as early as the planning phase in a targeted fashion with a high degree of reality, and with the eventual users included. Deficiencies and problems in the guidance system can thus be identified at an early stage and then dealt with in the planning process.

*"In MOVING, we succeeded in developing an intuitive and very realistic user interface for navigation in virtual space. Spatial perception and use aspects are precisely what brings about a tremendous increase in the degree of reality. Thus language, vision, movement, body position, action processes, attention, spatial interaction and activity all combine into a holistic image of usage experience. This helps in understanding how people 'process' a space, which elements they use in doing so or what they need when, where, and in what form along a trip chain in order to accomplish a specific task. It is thus possible to identify problem areas in the architecture and in the guidance system with future users and correct them in the early planning phases."*

DI Helmut Schrom-Feiertag, AIT Austrian Institute of Technology GmbH

## Characterization




## Impact

The iterative procedure in test runs in the virtual environment and the simulation provide planners and infrastructure operators with methods for developing, testing, and analyzing guidance systems in a cost-efficient and targeted fashion in a realistic virtual environment, with the future users and customers included in the process. The simulation furthermore makes it possible to simulate human route searching behavior in a cognitively plausible fashion, and provides the basis for an entirely computersupported evaluation.

## Implementation

The virtual test environment was tested successfully in the planning phase of the Vienna Central Station and it helped in improving the guidance of persons through the station.

**Contact:**
DI Helmut Schrom-Feiertag,
AIT Austrian Institute of Technology GmbH

**Partners:**
is-design GmbH,
ÖBB-Infrastruktur Aktiengesellschaft,
NOUS Wissensmanagement GmbH,
CURE - Center for Usability Research and Engineering,
Fraunhofer Austria Research GmbH,
Architekt DI Alfred Ritter

**Project runtime:** 10/2012 – 12/2014

**Research associates:**

INFORMATION / NAVIGATION

PONS

# Paradigms for Optimization of User Guidance in Road Traffic

**In the scope of the PONS project, novel interaction paradigms and technology concepts were developed to assist with walking to and from public transport modes, with a focus on "Equality in mobility".**

While there is already a wide spectrum of new, in some cases mobile support systems for using public transportation systems which calculate routes, warn of delays, or provide tickets online, there are hardly any systems to assist with walking to public transports systems, especially not for persons with limited mobility.

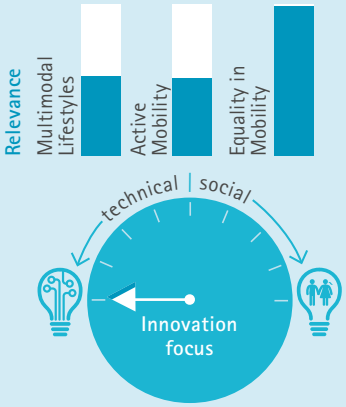
PONS (lat. "bridge") addressed these deficiencies in the mobility chain and on the basis of the results of previous projects, developed novel paradigms and technical systems for guiding users on foot. These paradigms and systems detect the particular travel needs of each individual and guide their users in a needs-driven manner. There were three research priorities. On their own, these research priorities were supposed to contribute to the reduction of mobility gaps. In combination, they were supposed to take an important step toward a simpler, equality in mobility solution, one that would enable handicapped persons as well as children, elderly persons, or cognitively challenged persons to be served equally:

1. Novel interaction paradigms in ticketing (for reducing the service gap)
   Result: Prototype for intermodal be-in/be-out systems
2. Novel localization concepts in indoor tracking (for reducing the orientation gap),
   Result: Framework and demonstrator for decentralized inertial navigation and dead reckoning.
3. New map annotations for pedestrian navigation (for reducing the information gap)

*"In the scope of our project, we tried to place people and their individual needs at the forefront. Not only did we develop technical solutions, but we also addressed the people's desires, fears, and concerns. Our success proves us right: More than 80 % of our test subjects gave us top grades for the ease in operating our systems and for their own personal benefits. However, the road to a simpler world in public transport is still a long one. There are still many unsolved problems which we must solve together."*

Dr. Wolfgang Narzt, Johannes Kepler Universität Linz

## Characterization




## Impact

In the scope of PONS, the technology used thus far for the technical development of be in/be out systems (ticketing systems in which the passenger is automatically issued an electronic ticket upon entering a vehicle) was replaced with new systems with very promising results and broader use options than before.

## Implementation

Owing to the nature of the research project, there are still no concrete practical implementations. Prototypes for verifying research questions with greater practical relevance have been developed.

**Contact:**
Dr. Wolfgang Narzt,
Johannes Kepler Universität Linz

**Partners:**
FH JOANNEUM GmbH,
JKU – Institut Integriert Studieren,
Wiener Linien,
Hilfsgemeinschaft der Blinden und Sehschwachen Österreichs,
Kompetenznetzwerk Informationstechnologie zur Förderung der Integration von Menschen mit Behinderung,
OÖ Verkehrsverbund-Organisations GmbH, Nfg.&Co KG,
50plus GmbH

**Project runtime:** 03/2014 – 02/2016

**Research associates:**

INFORMATION / NAVIGATION

VIDEA

# Visual Design for All

**The ViDeA project focused on enabling a better, barrier-free designing of public space through the coordinated use of contrasts, colors, light and materials. This was achieved through both laboratory and real world observations, which were incorporated in the development of a simulation software for architects and planners.**

While there has already been much work on solutions for visually handicapped people in the research landscape to date, the design dimension of public space was for the most part excluded or else viewed as not to be changed. Standards currently in effect are limited to generalizations regarding visual design issues and therefore complicate the work of both architects and contractors. In the scope of the ViDeA project, standards and directives pertaining to visual specifications were analyzed, an innovative test environment for contrast perception was developed, and on the basis of the findings obtained, onsite visits were made and the development of a "freedom from barriers" simulation tool for design models began.

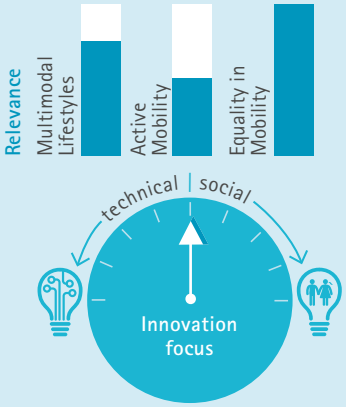

Figure: Analytical depiction of a subway orientation system

It turned out that numerous diversified accesses exist that could not be reduced to a common standard. On the basis of the findings from the laboratory tests and the onsite visits, however, scientifically sound information can be deduced for designing uniform sets of rules. The simulation tool that was developed definitely constitutes a highlight. For the first time, planners and architects have an easy way to test buildings yet to be constructed in terms of their freedom from visual barriers. Nevertheless numerous other relationships in visual design are still open and require further clarification.

*"The visual design of public space for enabling barrier-free mobility is one of the key starting points for future architects. Through intelligent selection of material and colors and of a lighting mix, a more pleasant and more efficient whole can be created for all travelers. This also creates a possibility for a sustainable change of mode selection in favor of public transport modes."*

PD Dr. Elmar Fürst, WU Wien, Institut für Transportwirtschaft und Logistik

## Characterization




## Impact

The main impact of the project work is that of increased awareness on the part of both project partners and other stakeholders of the fact that the visual designing of public space plays a key role in enabling barrier-free mobility and that going about it in an efficient manner makes sense from an economic standpoint as well.

## Implementation

The results from the ViDeA project are currently being incorporated in the development of new standards for the visual design of public space. Moreover, the findings are also being used in courses at the Technical University (TU) and the University of Economics and Business (WU). The simulation tool that was developed is a first step towards simplifying barrier-free designing for architects. However, it cannot be called a "market-ready" product in its present form.

**Contact:**
PD Dr. Elmar Fürst, WU Wien,
Institut für Transportwirtschaft und Logistik

**Partners:**
TU Wien, Department of Building Physics and Building Ecology,
TSB Transdanubia,
Hilfsgemeinschaft der Blinden und Sehschwachen Österreichs,
ÖBB Infrastruktur AG,
Wiener Linien GmbH,
MA 39

**Project runtime:** 03/2014 – 02/2016

**Research associates:**

INFORMATION / NAVIGATION

WAYS4ME

# Barrier-free mobility in the local public transport system!

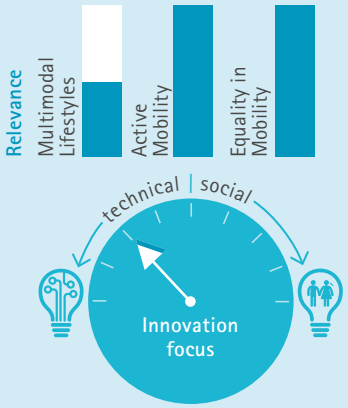
**The ways4me project focused on simplifying travel on the public transport system for people with special needs. The outcome was a barrier-free app for mobile devices that combines in- and outdoor navigation, querying transport information, communication with public transport means, ticket purchase and intuitive operation.**

In the ways4me project, a holistic solution was developed to make traveling on the public transport system easier in the future for people with special needs. The main target group of Ways4me consisted of blind and visually handicapped people. These people are faced with special challenges when traveling in public spaces. If these hurdles can be overcome, additional target groups such as tourists and other public transport customers will also have a novel, practical aid available for planning trips and orientation.

Users can now plan and manage their trips with the aid of schedule information from the Austrian traffic information service VAO (Verkehrsauskunft Österreich) and OSM (Open Street Map) material. To make it easier to use, the holistic app for Android smartphones was divided into different modules, which can be activated as needed. The system users navigate outdoors with the aid of a special GPS-based pedestrian navigation system and can thus find their way. The Open Street Map material used for this also permits extensions by the users. If one gets out of the reception range of the satellite-supported navigation system (for instance when entering the station building), an indoor navigation system is available.


Figure: Blind person using the vehicle communication with the trolley

## Characterization




## Impact

On the one hand, blind persons feel that their fears regarding road traffic are being taken seriously, on the other hand it is precisely this target group who contributes to improving overall freedom from barriers substantially. The user group is very good at using modern smartphones, can address the needs directly and provide excellent feedback on solutions. The user group is furthermore always careful to accept technical solutions only when there is no simpler practical solution. Through the intensive dialog with the parties concerned, with researchers and with transport operators, prejudices can be be eliminated and solutions can be found.

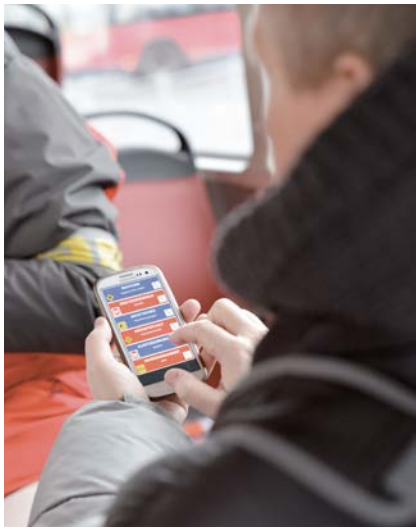


Figure: ways4me vehicle module app

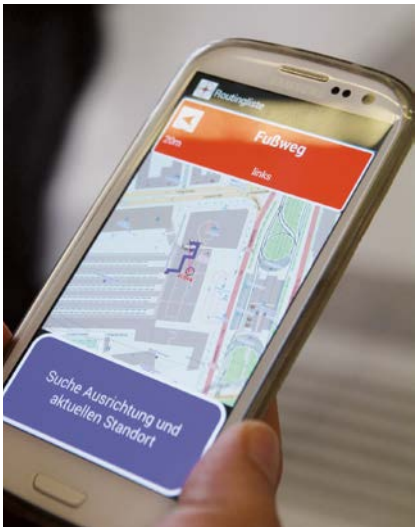



Figure: ways4me IndoorNavi

Indoor navigation was technologically implemented with WLAN, on the basis of pilot projects of the FH-JOANNEUM technical college. For accurately identifying the public transport vehicle, the vehicle module developed in "NAVCOM" was converted to BLE (Bluetooth Low Energy) and evaluated. This module makes it possible for blind persons to query all relevant information about a public transport vehicle and to send boarding and disembarking wishes.

In the development, special attention was given to an easy and completely barrier-free use of the user interface by means of Screenreader.

Figure: ways4me vehicle module test in Vienna Wiener Linien main workshops l. to r.: Bruckner_Malecek_Bischof

*"According to blind mobility expert Jürgen Schwingshandel, 'Blindness is an information impediment and not a mobility impediment.'"*

DI FH Werner Bischof, FH-JOANNEUM GmbH

## Implementation

For the EasyGo mobility app, the partner TAFmobile implemented the user interface according to the specifications from ways4me with very positive resonance. On the basis of the tests on the vehicle module, Wiener Linien incorporated a radio interface for vehicle communication in the call for bids for all new vehicles. Transport operators and contractors were able to get an idea of the pros and cons of a WLAN indoor navigation system first hand. The VAO (Austrian Transport Information Service) could be effectively employed for all participants and delivered impressive results for all requests.

**Contact:**
DI Werner Bischof,
FH JOANNEUM Gesellschaft mbH

**Partners:**
ÖBB-Infrastruktur Aktiengesellschaft,
Hilfsgemeinschaft der Blinden und Sehschwachen Österreichs,
ÖAR - Österreichische Arbeitsgemeinschaft für Rehabilitation,
ÖBW - Österreichische Blindenwohlfahrt,
Wiener Linien GmbH & Co KG,
Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e.V. (IIS Nürnberg),
BSVÖ - Österr. Blinden- u. Sehbehindertenverband, Landesgruppe Wien, NÖ u. Bgld.,
TAF Mobile GmbH

**Project runtime:** 10/2012 – 01/2015

**Research associates:**

INFORMATION / NAVIGATION

WETTER-PROVET

# Personalized, situation- and route-specific weather information

**The goal of Wetter-PROVET was to create foundations for a "guardian angel service", which on the basis of a personal mobility profile, monitors typical routes taken by users and gives situation-specific alerts concerning weather events that may influence the choice of a transport mode and a route.**

Whether we ride bicycles, walk, use the bus, train, or our own car depends upon a multitude of factors such as time, cost, and comfort. All of these factors enter into modern decision-based transport demand models. The weather also influences the decision as to which transport mode will be used and whether or not a given path will be taken. Extraordinary events such as heavy rains, snow and extreme cold in particular, but also sunshine and pleasant temperatures influence the mobility demand and thus lead to greater or lesser traffic volumes.

Thus the foremost goal of "Wetter-PROVET" was to develop methods for the personalized, situation-specific and timely provision of information about relevant weather conditions. To this end, "Wetter-PROVET" used the methods that were developed in the PROVET project to create a mobility profile of a commuter. This profile comprised frequently used routes between identified points of interest (residence, workplace, etc.), the transport mode used on these routes, and also typical departure times. By monitoring these periodic routes, it is now possible to give personalized and situation-specific alerts in a targeted manner, not only about transport problems but also about weather events.

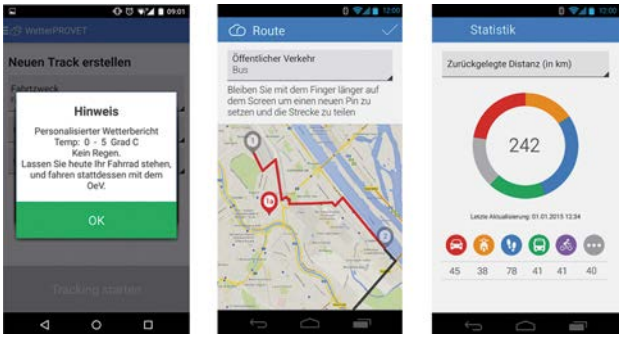
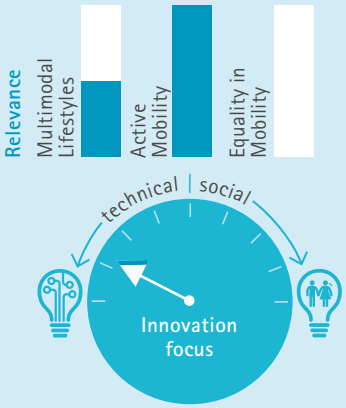



Figure: Screenshots from the app. Far left: a notification of a personalized message, center: one of the plotted routes, and right statistics on all plotted routes.

*"One of the goals of Wetter-PROVET was to develop models that enable personalized recommendations to be given. With the personalized transport means selection models developed in Wetter-PROVET, it was possible to show that the accuracy of the prediction of the actually chosen transport means could be increased from 63% to more than 75% after just a few observed decisions."*

Dr. Christian Rudloff, AIT Austrian Institute of Technology GmbH

## Characterization




## Impact

The algorithm refines the mobility profile daily on the basis of newly collected routes. Furthermore, the most likely transport mode for the respective routine route is determined with the aid of the personalized mobility profile, with a weather report factored in. If a deviation from the usual behavior is to be expected because of weather conditions, a notification corresponding to the personal behavior pattern is sent out.

## Implementation

Algorithms such as transport mode recognition are already in use in the AIT service Smart Survey and will be used for technology supported collections of mobility data. The personalization algorithms were used in research projects such as Crossing Borders and underwent further development in order to produce improved route tools.

**Contact:**
Dr. Christian Rudloff,
AIT Austrian Institute of Technology GmbH

**Partners:**
FLUIDTIME Data Services GmbH,
UBIMET GmbH

**Project runtime:** 10/2012 – 03/2015

**Research associates:**

NEW MOBILITY SUPPLY AND SERVICES

E-CARUSO

# Car sharing with e-cars – technology adapted for user-appropriate mobility services

**In the E-Caruso project, tools were optimized for car sharing (based on Caruso) with e-cars. In particular, new on-board units were also developed, which enable communication with the on-board electronics of the car. The Caruso web application with the interfaces was adapted; the users get additional feedback on driving behavior, power consumption, and the charge level of the battery.**

Figure: Analysis work being performed on the on-board unit of an E-Caruso test vehicle

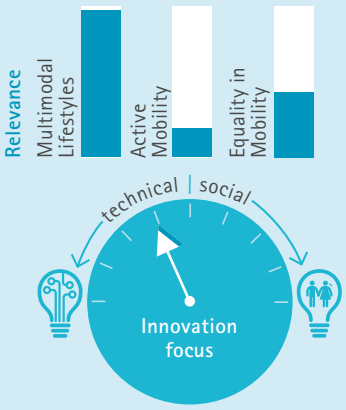
In the E-Caruso project, the Caruso toolbox was upgraded specifically to fit the needs of ecar sharing and used by test groups in the well-established form of user innovation. Specifically, this involved the development of new on-board units. Among other things, the battery charge level as well as the charging process can be monitored and the central locking system can be controlled by telephone via these units. The last-mentioned function is especially advantageous for intermodal trip chains. The car can be turned in at the station in a flexible manner, without having to hand in a key or without having to deal with chip cards.

Also built in were functions for monitoring driving behavior and for providing the driver with improved feedback. The Caruso web application and its interfaces were upgraded in accordance with needs and practical experiences. In the project, the aids that were developed were tested and continuously optimized by 20 car sharing test groups with e-cars.

*"Car sharing in the rural sector and with e-cars? That was unconceivable at the start of the project. More than 50 e-car sharing cars with our technology are now in service in Austria alone. And each year there are more."*

DI. Christian Steger-Vonmetz

## Characterization




## Impact

Key elements of the organizational concept and of the technical system for e-car sharing in the rural sector were developed in the scope of E-Caruso. There are now more than 50 e-cars in Austria, which are mainly distributed in small communities. This initiated a sustainable development that has since also received international recognition. Invitations to Lucerne, Berlin, Brussels, Milan, and Ishinomaki (Japan) to give presentations and demonstrations followed. Many of the technical features that were developed in the scope of ECaruso (mobile website, unlocking the car by smartphone, transmission of the battery charge level, multilinguality) have since become standard.

## Implementation

The company Zemtu OG, which operates and further develops the web application as a service, is a direct spin-off from the project. The software is already in use in several countries.

**Contact:**
DI. Christian Steger-Vonmetz

**Partners:**
Babalas e.U.,
Convadis AG,
DI Philipp Metzler

**Project runtime:** 06/2012 – 08/2014

**Research associates:**

NEW MOBILITY SUPPLY AND SERVICES

GIVE&GO

# Development of a private transportbased, non-profit mobility service

**The emphasis of the GIVE & GO research project was on the prototype development of a non-profit and private transport-based mobility service, which relied on the neighborly commitment of residents, state-of-the-art technological solutions (web tools, social media), as well as personal support.**


Figure: Mobility table and multifunctional beverage lid for the Give&Go Service

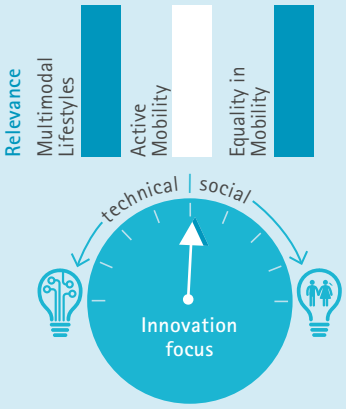
The GIVE & GO Mobility Service combined aspects of both technological (internet-based platforms for spontaneous search requests, e.g., for arranging rides) and social innovation (revival of regional exchange platforms), especially for offering high quality mobility solutions in areas and times of little transport demand. The development of a mobility service based on neighborly commitment created valuable additional mobility opportunities, without putting additional stress on the environment, by making use of trips that take place anyway in the scope of individual and private transport. Hence the main task of the Mobility Service was that of hooking up potential drivers with potential riders.

In order to bring this about, the GIVE & GO idea built upon a mixture of digital and analog aids as well as direct contact with residents in the pilot region of Vorarlberg. The internet-based matching platform talente.mobil.net that was developed was designed to expand the existing exchange service of the regional TALENTE platform as easily as possible. The talentemobil.net platform was promoted at several events in the pilot region, and supplemented by readily accessible analog tools (including a ride table and multifunctional beverage lid designed especially for easily arranging for a ride at events).

*"The unique thing about this idea for providing valuable mobility opportunities lies in the simplicity of the organization, the lack of dependence on subsidization, and the openness of the system."*

A.o.Univ.Prof. Dr. DI Georg Hauger, Technische Universität Wien

## Characterization




## Impact

Although the attitude of the interviewed residents toward the GIVE & GO Mobility Service was positive, the impact of the service on mobility habits was nearly impossible to evaluate. The biggest challenges posed to a mobility service include legal questions regarding liability, issues of trust between drivers and riders, as well as the forward-looking mobility planning of the residents of the pilot region, which should definitely be considered a positive thing.

## Implementation

The GIVE & GO pilot operation was introduced at cultural events in Vorarlberg between mid-2013 and 2014, first to young residents and later to members of the TALENTE exchange association.

**Contact:**
A.o.Univ.Prof. Dr. DI Georg Hauger,
Technische Universität Wien –
Fachbereich Verkehrssystemplanung |
Department für Raumplanung

**Partners:**
Rosinak&Partner ZT GmbH,
FLUIDTIME Data Services GmbH,
Wirtschaftsuniversität Wien -
NPO-Kompetenzzentrum,
Vorarlberger Auto-Touring Club

**Project runtime:** 07/2012 – 06/2014

**Research associates:**

NEW MOBILITY SUPPLY AND SERVICES

KIDS2MOVE

# Integrative networking system for optimizing the transport of children

**An integrative networking system for optimizing the accompanied transport of children will be used to achieve the objective of exerting lasting influence on awareness and decision-making processes in choosing transport modes.**

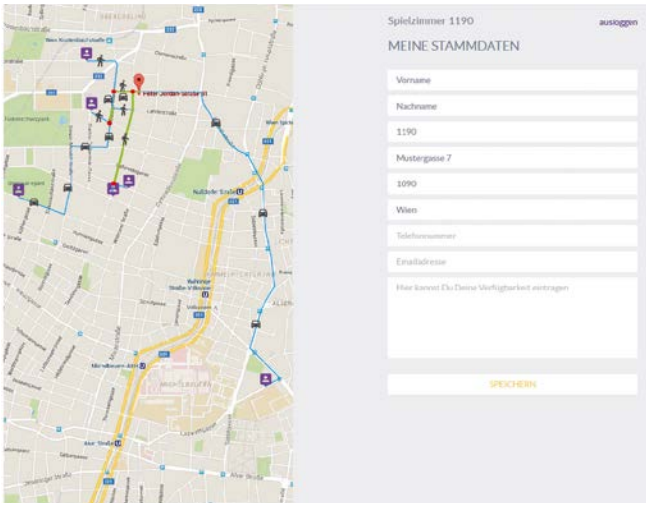



Figure: "Look-inside" in kids2move

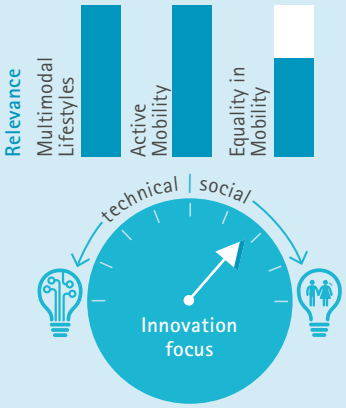
In the scope of the kids2move project, the goal is to exert a sustainable influence on awareness and decision-making processes in choosing modes for the accompanied transport of children, and by doing so break rigid patterns in motorized private transport and enable new transport behavior patterns to emerge. This change in behavior will hopefully have an impact on overall mobility behavior and thus foster a new understanding of mobility.

Another key objective is that of highlighting individual "active mobility" options in the scope of accompanied transport of children in order to develop heretofore unexploited potentials. A further aspect is to provide children with "equal opportunities" in terms of learning about and using different modes of transport and to achieve benefits (especially for women) by saving time.

*"The objective of exerting a sustainable impact on awareness and decision-making processes in choosing modes for the accompanied transport of children in the scope of kids2move is undisputed and has met with very widespread approval in the scope of the project work. The behavior change sought after, starting in early childhood, would exert an influence on the overall mobility behavior of, say, a family and thus foster a more sustainable access to mobility, or a new understanding thereof."*

DI Dr. Alexander Neumann, netwiss

## Characterization




## Impact

Because a practical implementation is stillnot possible, no impacts have been observed yet. However, the potential of a sustainable impact on awareness and decision-making processes in choosing modes for the accompanied transport of children in a practical use context is rated as extremely high.

## Implementation

There are still no practical applications of the "kids2move" integrative networking system for optimizing the accompanied transport of children.
A further development, especially a conversion of the system to VAO (GIP) as a data base for routing and transport information, is a factor that is critical to a successful practical application.

**Contact:**
DI Dr. Alexander Neumann, MA MSc
netwiss

**Partners:**
FACTUM Chaloupka&Risser OHG,
Greiner Pancot 5 Sinne,
Universität für Bodenkultur Wien - Institut für Verkehrswesen,
one's own, pn-venture GmbH

**Project runtime:** 04/2014 – 03/2016

**Research associates:**

NEW MOBILITY SUPPLY AND SERVICES

MOBIHELFER

# Door-to-Door Mobility Aid

**The goal of the MobiHelfer project was that of developing a service package specifically for persons of limited mobility that makes independent door-to-door mobility significantly easier or even possible in the first place.**

Numerous national and international laws, standards, and directives set forth that unrestricted access to transport systems must exist for all user groups, regardless of any mobility limitations. In doing so, consideration must be given to the greatest possible independence of the respective groups. Due to necessary transitional provisions on the one hand and structural conditions on the other hand, complete barrier-free mobility has yet to be established in many areas of mobility through construction, organizational, and IT measures. Nor is it likely to be in the near future or in the medium term, and in some cases not in the long term either.

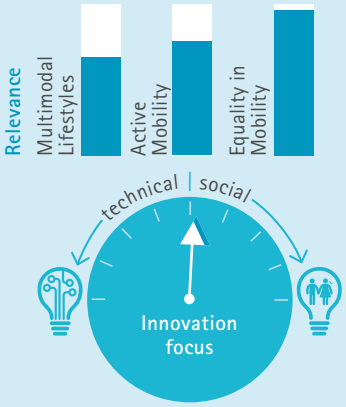
In the MobiHelfer project, a suitable mobility helper service package for everyday mobility and for transregional travel has been developed using existing best practice analyses. Also included in this process were relevant user needs in direct consultation with involved persons and associations. For this purpose, a modular service package combined with modern information systems was designed, the modules of which fufill the specific demands of each different potential user group in the best possible and most economical manner. The heart of the system is the bringing together of persons who need ad hoc aid and persons who are willing to help.

Because the usefulness of implementing a suitable communication-based service package has been demonstrated, a prototype is now being developed as part of a follow-up project. It will be tested under actual conditions.

*"The MobiHelfer system is making a concrete contribution in support of independent mobility. The 'MobiHelfer' project highlighted both the feasibility of and the interest in the system - approx. 50% of the mobility-limited persons surveyed expressed interest in obtaining aid services from the MobiHelfer system in case of need. On the basis of these findings, a prototype will be developed and tested in the subsequent 'MobiHelfer2' project."*

Mag. Manuela Winder, Project Aassistant,
Institut für Verkehrswissenschaften, TU-Wien

## Characterization




## Impact

The impacts will become evident after the conclusion of the successor project already underway, in which a prototype is being developed and tested. In any case the "MobiHelfer" service package ought to make a decisive contribution to independent mobility. Depending upon the personal mobility limitation, approx. 50% of the individuals surveyed in the studies would avail themselves of the assistance arranged through MobiHelfer.

## Implementation

MobiHelfer was an "industrial research" project and therefore very basic. The project results were further pursued the MobiHelfer2 development project, which is currently underway and in which a prototype is to be developed and tested under actual conditions. A decision regarding a concrete implementation will be made on the basis of successful tests in the successor project.

**Contact:**
DI Dr. Bernhard Rüger, netwiss

**Partners:**
ÖAR,
Technische Universität Wien - Institut für Verkehrswissenschaften,
Benjamin Petutschnig International, Consulting (IMS),
Schweizerische Bundesbahnen,
Schweizerische Fachstelle Behinderte und öffentlicher Verkehr (BöV)

**Project runtime:** 03/2013 – 08/2014

**Research associates:**

NEW MOBILITY SUPPLY AND SERVICES

MYTRIP

# Jointly-Individually-Mobile

## A car sharing service started by private initiatives and based on the use of a communication platform was developed in the "MyTrip" project.

The "MyTrip" project strove for a better linkage of existing public transport modes and public transport information with a novel car sharing approach in Vienna and the surrounding area. Although public and intermodal transport information is provided in Vienna by, e.g., Wiener Linien and ITS Vienna Region, more and more free of charge applications are also becoming available. A novel crowd sourcing approach is being pursued in order to fully exploit the car sharing potential in Vienna.

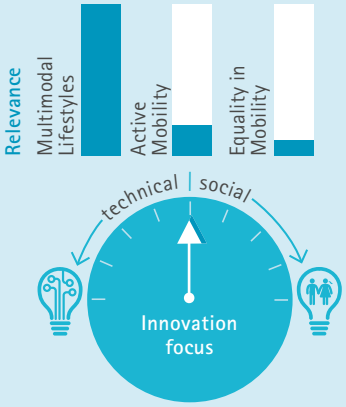
The quickest way to the pool car is provided, the car is put into operation, and the time used is calculated via the smartphone app. Other project priorities were the linking with Park & Ride facilities for commuters and the elaboration of new fee structures (keyword: mobility card). New communication media (social networks and smartphones) were worked with intensively, and an extensive test run was carried out in Vienna. Also prioritized in the project were awareness raising measures so that future users would also know about these novel mobility offerings.


Figure: Example of a car sharing vehicle (E-Caruso)

*"Car pools increase the efficiency in the transport system, provide additional mobility options in less developed regions, and simultaneously contribute to climate protection. The strong and still growing spread of social media opens up new perspectives for implementing user-based organizational models for ride sharing opportunities."*

DI Manfred Schrenk, CEIT Research Network

## Characterization




## Impact

The project made it possible to gain new experiences in the area of integrated sharing offerings. Numerous car sharing offerings and so-called freefloating services (e.g., Uber, Car2Go,...) have since become established in Vienna.

## Implementation

The results of the "MyTrip" project were further pursued in the Caruso Carsharing Platform http://www.carusocarsharing.com/.

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**Contact:**
Heimbuchner Consulting GmbH,
Allmenda social business e.Gen. (formerly: Talent Dienstleistung und Handel e. Gen.),
DI Philipp Metzler

**Project runtime:** 09/2011 – 05/2013

**Research associates:**

NEW MOBILITY SUPPLY AND SERVICES

NET(T)RIDE

# Using social networks to optimize ride sharing

**The project follows the approach of integrating dynamic ride sharing in attractive, heavily frequented social media platforms in order to reach "critical mass" and increase acceptance through virtual familiarity.**

Spontaneous car pooling, aka ride sharing, increases car occupancy level and, as an additional mobility service, ensures that people who do not have cars, have limited access to public transport means, or who cannot drive because of a handicap are able to participate in society without giving rise to additional car traffic. In spite of all of the advantages, ride sharing has yet to become well-established in actual practice. The reasons for the lack of popularity are barriers such as little trust in strangers, intrusion in private or intimate spheres during the ride, lessening of the flexibility of car drivers due to circuitous routes, delays, etc., complicated cost arrangments between drivers and passengers, lack of user friendliness of ride sharing platforms, lacking incentive systems, etc. For most users then, ride sharing is only a mobility option if it is available at the spur of the moment, the potential driver or rider is trustworthy, and it is easy for both parties to arrange the ride.

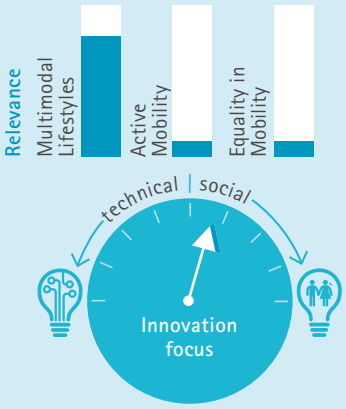
The rapid progress being made in information and communication technologies offers great opportunities to overcome these barriers. These technologies are lending impetus to the development from static to dynamic ride sharing. Internet-capable smartphones can be used to query and/or exchnge information on current locations, destinations, personal profiles, etc., of drivers and passengers in real time, which in turn results in a high level of flexibility and rapid obtaining of information for the complex organization of ride sharing. Social media platforms (e.g., Facebook) are widespread among the populace and provide linkage points for building contacts and confidence in new systems.

The essential features and interrelationships of currently marketable online-based ride sharing systems, incentive and payment systems, networking with social media, matching of drivers with riders, etc. were identified and compiled in net(t)ride. net(t)ride provides a conceptual solution proposal as to how a business model, mock-ups, social matching methods, connection of social online-based networks, system architecture, interface solutions, etc., for a dynamic ridesharing plattform might look. A target grouporiented approach was taken in order to identify the technological and organizational system requirements for this. User preferences were systematically determined by means of literature searches, stated preferences and motive surveys, and also two focus groups.

*"Car pools increase the efficiency in the transport system, provide additional mobility options in less developed regions, and simultaneously contribute to climate protection. The strong and still growing spread of social media opens up new prospects for implementing user-based organizational models for ride sharing."*

DI Manfred Schrenk, CEIT Research Network

## Characterization




## Impact

The results that were obtained form the basis for optimizing and increasing awareness of dynamic ride sharing. The analysis of the preferences of students and commuters as potential user groups is of direct benefit to the designing of the system. The surveys showed that both user groups are interested in ride sharing systems.

## Implementation

Along with the substantial contribution to the spread of ride sharing, this project also provides impetus for the future implementation of innovative ride sharing and car pooling systems. In 2013/14, numerous discussions were held with the German ride sharing center flinc and the Vienna airport (Flughafen Wien AG) regarding the further development of the project concept; one of the things discussed was an implementation of project content in the scope of corporate mobility management.

**Contact:**
DI Manfred Schrenk,
CEIT Research Network

**Partners:**
CEIT ALANOVA gemeinnützige GmbH (liqu.),
Verkehrplus – Prognose, Planung und Strategieberatung GmbH,
MJ Landschaftsplanung e. U.,
Synthesis-NET LLC (Ungarn)

**Project runtime:** 09/2012 – 02/2014

**Research associates:**

NEW MOBILITY SUPPLY AND SERVICES

ÖFFI-FEEDBACK

# Feedback system in public transport via an app and social media

**During the "Öffi-Feedback" project, an innovative feedback system was designed, prototypically developed and evaluated. It enables public transport passengers to provide both negative and positive feedback to the responsible transport operator in a convenient, rapid, and in-depth manner.**

Did the trolley get a late start? Chewing gum on the bus seat? Praiseworthy staff? There are many reasons for passengers wanting to report positive as well as negative experiences in public transport to the operator. But thus far the feedback process has been complicated and unsatisfactory for all parties.

The project is improving this situation by enabling passengers and public transport operators to communicate bidirectionally by means of a smartphone app. In combination with an integrated social media monitor, the mobility service provider can address the wishes of its passengers quickly and transparently, thereby increasing customer satisfaction and ultimately ensuring customer loyalty. The decisive innovation lies in the modular design of the Öffi-Feedback system, which enables mobility service providers to make adaptations as required and with relatively little effort.

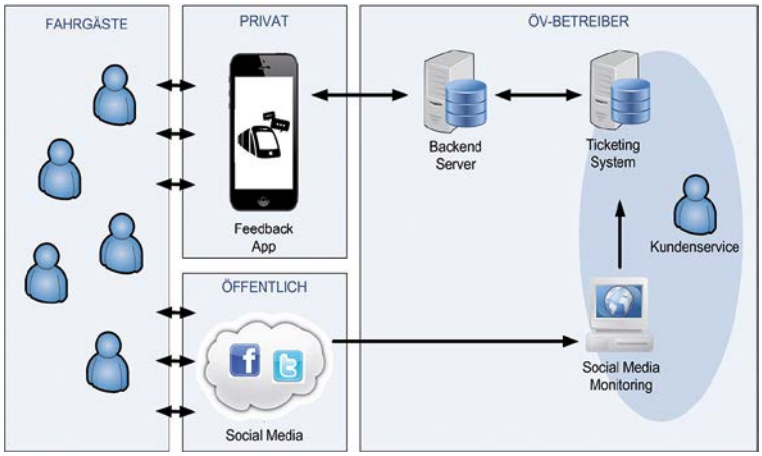
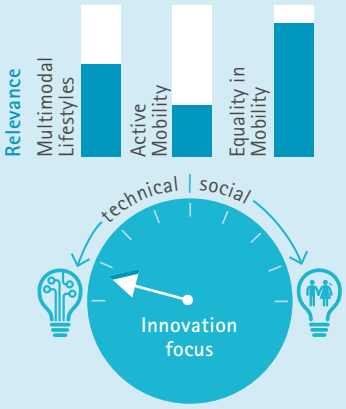



Figure: Overview of the design of the overall system, which is composed of the following three system components
1) Öffi-Feedback app,
2) social media monitoring system, and
3) the ticketing system, including interface solutions.

*"Preliminary results in the test phase confirm that many, especially younger public transport customers prefer the Öffi Feedback app over standard feedback channels (e.g., letter, telephone, email). But in order to reach everyone, a diversity of channels is important for a complaint management system."*

DI Mag. Mario Platzer, yverkehrsplanung GmbH

## Characterization




## Impact

The innovative feedback system not only contributes to assuring and increasing user acceptance on the part of passengers, but also helps mobility service providers improve their services continuously and cost effectively.

## Implementation

The Öffi-Feedback system was field-tested for five weeks at the Mürztaler Verkehrsgesellschaft (MVG) transport company in the Kapfenberg - Bruck/Mur - Leoben region for serviceability, functionality, passenger acceptance, etc. During the test phase, the Öffi-Feedback system ideally fulfilled the practical requirements of the MGV, which is a midsized mobility service provider. The upgrading of the existing service with the Öffi-Feedback system was met with much enthusiasm by both the general public and the employees and managers of the MVG.

**Contact:**
Univ. Prof. Dr. Martin Berger,
erkehrplus - Prognose, Planung und Strategieberatung GmbH

**Partners:**
DI Gunther Lenz,
FH JOANNEUM Gesellschaft mbH,
evolaris next level GmbH,
Mürztaler Verkehrs-Gesellschaft m.b.H

**Project runtime:** 10/2012 – 12/2014

**Research associates:**

NEW MOBILITY SUPPLY AND SERVICES

PEBAWI

# Project for designing commuter transport between Bratislava and Vienna

**The prototype of an online platform was created during the PEBAWI project. This platform organizes and facilitates the use of the sustainable and economical mobility form of ride sharing, with consideration given specifically to the needs of commuting workers and students in the region.**

Vienna – Bratislava is one the fastest growing economic regions in Europe. However, this positive economic development is accompanied by a heavy traffic volume between the twin cities and the resulting negative consequences for people and the environment. One of the things contributing to this problem is the thousands of commuting workers and students who travel back and forth in the region daily.

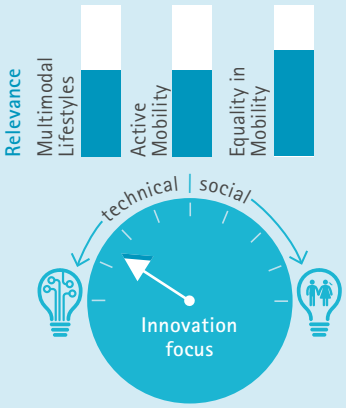

Figure: Screenshot of the PEBAWI online platform homepage

During the PEBAWI project, an online platform was created for organizing and facilitating the use of the ride sharing mobility form. In doing so, consideration was given specifically to the needs of professional and student commuters in the Vienna – Bratislava region. In order to achieve an outcome adapted to the needs of the end users, the latter were closely involved in the different project phases. A literature search was followed by a quantitative survey of the target group regarding their current mobility behavior, their attitude toward ride and ticket sharing, and their expectations regarding a communication system. There were also qualitative interviews and focus groups. On the basis of these results, the prototype of an online platform was developed and retested by potential users. Matching of drivers and riders as well as incentive systems, payment systems, and systems for rating individuals were optimized, especially from a user standpoint. Also developed was a communication concept for advertising the platform as well as for raising awareness of sustainable mobility in general. The project results thus form the basis for traffic shifting and traffic reduction strategies.

*"PEBAWI responds to transnational needs in the mobility area. The potential users of the platform (commuters between Vienna and Bratislava) were systematically involved in the development work. Specific user needs as well as any concerns of the intended target group could thus be ascertained in detail and given adequate consideration. The user tests revealed a very high level of acceptance of the PEBAWI platform on the part of the target group."*

Mag. Ulli Röhsner, MAKAM Research GmbH

## Characterization




## Impact

In an expert workshop, the results of the study were discussed with experts and a concept was developed for dissemination of the platform and for general awareness raising in the target group.

## Implementation

The findings that were obtained could be further exploited and the online platform that was developed could actually be implemented in the scope of a successor project or through other subsidies.

**Contact:**
Mag. Ulli Röhsner,
MAKAM Research GmbH

**Partners:**
Polymorph OG,
FACTUM Chaloupka & Risser OHG,
Die Berater Slovensko, s.r.o.

**Project runtime:** 11/2011 – 05/2013

**Research associates:**

NEW MOBILITY SUPPLY AND SERVICES

TRANSITBUDDY

# Autonomous vehicle at major public transport hubs for users with limited mobility

**In the "TransitBuddy" project, a concept was developed for an autonomous vehicle for helping passengers at transfer points of the public transport system and for enabling all travelers, especially persons with limited mobility or travelers with heavy luggage, to transfer safely and conveniently.**

At major transport hubs it is sometimes necessary to cover considerable distances when transferring to other transport modes. For people with physical (mobility) limitations and passengers with luggage, long distances are difficult and often constitute a barrier for the entire trip and thus a restriction of the mobility radius. The "TransitBuddy" project took on the task of developing a smart luggage trolley and navigators to assist passengers at transfer points of the public transport system. The "TransitBuddy" thus makes it easier for all travelers, especially persons with limited mobility or travelers with heavy luggage, to transfer safely and conveniently. The technical, organizational, and user-oriented aspects for the deployment of autonomous vehicles to assist various passenger groups at major public transport hubs were studied in this research project.

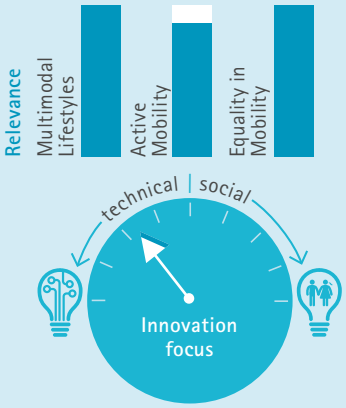
Figure: Design prototype of the Transitbuddy in the user test

The major challenge lies in the fact that, unlike other autonomous vehicles that travel on defined paths separately from pedestrian traffic, this "TransitBuddy" must share the space with other passers-by. For the autonomous control of the TransitBuddy, the technical concept thus provides for the installation of various sensors such as laser scanners or cameras, which supply the rolling navigators with information about their immediate and remote surroundings. The components developed in the project for this purpose were field tested with a special robot platform in the Vienna Central Station. Conclusions could thus be drawn from the interaction of the sensor analysis, localization, navigation, indoor routing, obstacle detection, and the control program directly on site.

*"In the 'TransitBuddy' project, the foundation was laid for the creation of an autonomous vehicle to help people transfer safely and conveniently and navigate major transport hubs. From the project, we obtained valuable findings on the navigation of autonomous vehicles in an environment with people, on the sensor technology necessary for this, on the vehicle construction, and on the intuitive design. We were thus able to develop a vision of how people could interact with autonomous systems on a daily basis in the near future."*

Dr. Stefan Seer, Scientist, Mobility Department

## Characterization




## Impact

The concept provides an entirely new service for passengers. Persons with limited mobility in particular, who used to be at least partially dependent on escorts or on special services that had to be arranged in advance, now have the possibility of independent mobility in train stations.

## Implementation

The design approach developed in the project was implemented in the form of a mock-up faithful to the original design, down to the depiction of various functions. The different use cases of the TransitBuddy were presented in the form of an animated video. The final evaluation of the design concept was in the form of quantitative surveys at the "Wiener Westbahnhof" station and qualitative surveys in two focus groups. These surveys provided valuable feedback for practical implementation.

**Contact:**
Dr. Stefan Seer,
AIT Austrian Institute of Technology GmbH

**Partners:**
DS Automation GmbH,
bkm design working group,
ÖBB-Infrastruktur AG,
TU Wien - Institut für Automatisierungs- und Regelungstechnik,
TU Wien - Institut für Konstruktionswissenschaften und Technische Logistik,
netwiss OG

**Project runtime:** 09/2012 – 12/2014

**Research associates:**

NEW MOBILITY SUPPLY AND SERVICES

STORE&GO+

# Development of a prototype of a barrier-free, automated luggage storage system with volume-optimized storage

**The project offers a prototype development of an automatic goods and luggage storage system for future passenger transport stations. Through innovative volume optimization, the technology addresses the size diversity of luggage items and also doubles the capacity of the always scant amount of space, thereby boosting the appeal of public transport.**

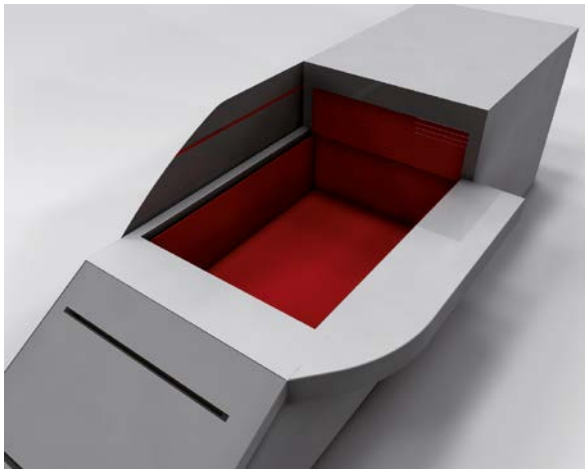


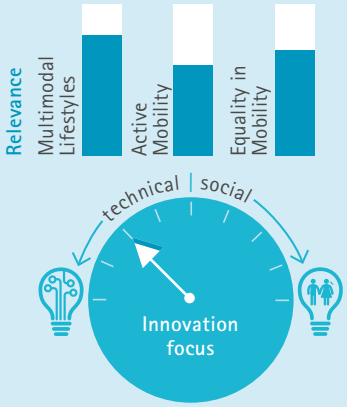
Figure: Design model for the storage system

In view of the transformation of transport hubs into multifunctional business centers, an effective design of customer services at stations is necessary in order to meet the changed demands of public transport. Modern transport hubs are no longer used just for travel, but also for local supply, business communication, and shopping. Consequently, public passenger transport demands storage systems that can be used temporarily for relieving passengers of the tedious chore of handling luggage and the associated stress and sacrifice of comfort and convenience.

The course of the project followed the schedule of milestones and deliverables and ended in a prototype design for a flexible overall concept with automated system and IT components in the form of a mock-up. The latter underwent a user test by future system customers at the St.Pölten station. The following details were worked out:

- Operational specifications and "system-typical examples" of the ÖBB (Austrian national railroad) as a possible operator in Austria.
- Transformation of a storage robot by employing specific control and sensor systems based on "commissioner" technologies that have already been proven on the part of the partner firm TGW.
- Comprehensive user surveys for determining the ergonomic design of different operating variants.
- Potentials for actual product development and final solution alternatives
- Operator model for "system-typical" train stations.

## Characterization




## Impact

Advantages over standard locker systems lie chiefly in the efficient and practical use of station infrastructure as storage space. It is thus possible to remedy the frequently prevailing lack of space and obtain valuable sales area. Because the Store&Go+ technology enables efficient use of the room heights of the station infrastructure as storage space, station operators also experience advantages over standard locker systems. New and ergonomically improved services for depositing and storing luggage or small goods will be available for future users.

Figure: Design model for the storage system

The concept that was developed offers an easy, automated, and ergonomic option for storage, which can not only be implemented in the planning of new stations but also implemented subsequently. The system is composed of various software and hardware components, the key components being a modular highbay storage, a situation-adaptive loading station with self-explanatory and intuitive user guidance as well as volumeoptimized container technology. The software components consist of the user interface and the associated processes. Particular emphasis was placed on ergonomic aspects and an attractive design in the implementation phase.

Figure: Storage system with terminal

*"The Store&Go+ system is a service innovation that can help influence mobility behavior in urban areas in a sustainable, positive manner. To this end, appealing storage services are employed for relieving people of their luggage and everyday shopping items."*

FH-Prof. DI Hans-Christian Graf,
FH OÖ Forschungs&Entwicklungs GmbH

## Implementation

An implementation in actual practice was planned at the Vienna Central Station. However, the construction progress as well as budget and time constraints of the ÖBB prevented this. But in general, by optimizing the use of space, the user-friendly Store&Go+ deposit system may enable services at public transport hubs, train stations, or shopping centers to be more attractively designed in the future.

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FH-Prof. DI Hans-Christian Graf,
FH OÖ Forschungs&Entwicklungs GmbH

**Partners:**
ÖBB-Infrastruktur Aktiengesellschaft,
TGW Mechanics

**Project runtime:** 10/2012 – 09/2014

**Research associates:**

PLANNING / MODELING / SIMULATION

AVISO

# Adaptive transport infrastructure optimization through dynamic modification of buildings

**In the AVISO project, a planning tool that analyzes and optimizes passenger flows in complex public transport stations was developed for architects and transport operators.**

Planners can make temporary changes to infrastructure elements in dynamic fashion during the simulation. Examples of such changes include the travel direction of escalators and the capacity of elevator. The impacts on the flows of people can be instantly compared and evaluated in an integrated analysis tool, which has been adapted to the needs of infrastucture planners. The most common bottlenecks to flows of people can then be identified with the aid of different density analyses. The AVISO results can be used to answer diverse questions on analyzing and predicting complex flows of people in public transport networks.

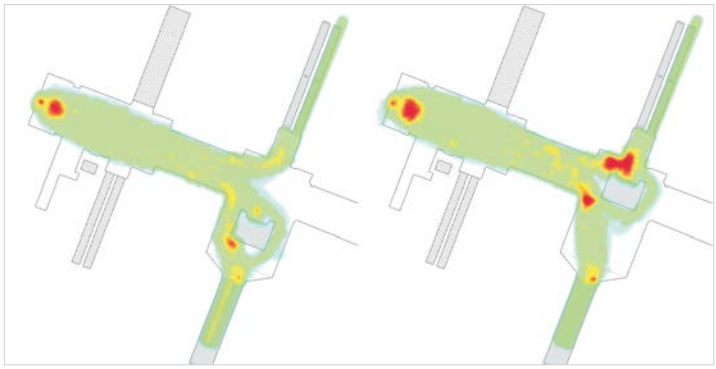


Figure: Comparison of the crowd density in the Heiligenstadt station, with 6000 pedestrians per hour: positioning the elevator on the left results in small areas of high density, whereas positioning it on the right results in large areas of high density.

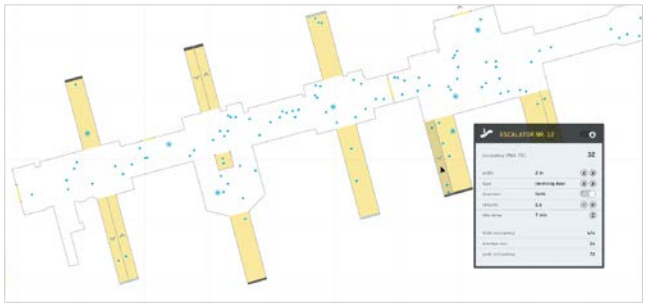
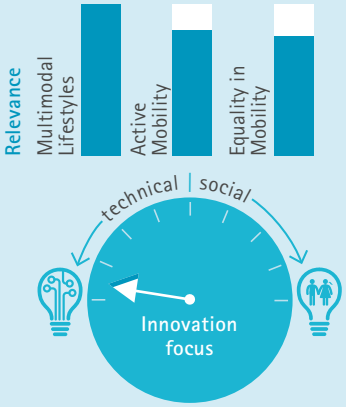


Figure: Mockup of the AVISO crowd flow simulation

*"With AVISO, we were able to accomplish the objective of making pedestrian simulations more accessible to both researchers and users through an improved workflow. The developments also formed a solid basis that has already been successfully employed and further developed in many other projects."*

DI Martin Stubenschrott, AIT Austrian Institute of Technology GmbH

## Characterization




## Impact

With AVISO, the efficiency, safety, and comfort of infrastructures can be optimized and the attractiveness and acceptance of public transport can be increased during the planning process.

## Implementation

Adaptive transport infrastructure optimization enables overtaxed sites in the transport network to control flows of people more effectively and thus increase the efficiency of personal mobility. As a specific example, the positioning of an elevator in the "Heiligenstadt" subway station was studied.

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Ostertag Architekten,
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**Project runtime:** 10/2012 – 09/2014

**Research associates:**

PLANNING / MODELING / SIMULATION

BIOHALT

# Natural public transport stop module system

## The "BioHalt" project involves designing, developing, and constructing a "natural" modular and economical public transport stop system in rural communities.

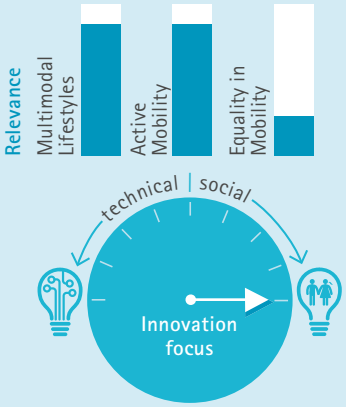
Unfortunately, many bus stops as well as some train stations in Austria often fulfill only the minimum requirements. They often have nothing more than a post with a sign and a schedule. The focus of the BioHalt public transport stops is on a modular design, low investment and maintenance costs, natural (100% recyclable) construction materials, and individual and community well-being. A business model is also being developed in parallel with the technical development, which includes financing (by sponsors, for example) and in which a "Leasing of a Biohalt public transport stop" business model is also being developed.


Figure: Examples of designs for "Biohalt" stops

*"The 'Biohalt' project showed that attractive stops are an important component of a public transport system. Although the quality of the stops in large population centers with heavy passenger traffic is quite satisfactory, waiting options that offer protection are often scarce in rural areas. There are no provisions for the construction of 'passenger-appropriate' stops in the legislation relating to public transport. Thus neither transport associations nor transport operators are responsible for the design, construction, and operation. If a given community even has 'passenger-appropriate' waiting facilities in the first place, then they were usually funded by that community. 'Biohalt' offers the opportunity to construct 'passenger-appropriate' and customdesignable waiting facilities with few financial resources and much personal initiative, and can thus contribute to the sustainable strengthening of the public transport system."*

Dipl. Ing. Alexander Fürdös

## Characterization




## Impact

The project is another step towards sustainable and efficient personal mobility. With the aid of prototypes, it was also discovered that there is definitely acceptance on the part of residents.

## Implementation

An effort is being made to use this concept of natural public transport stops in rural communities and in certain municipal areas as well.

**Contact:**
Dipl. Ing. Alexander Fürdös

**Partners:**
MJ Landschaftsplanung e.U.,
Herbert Seelmann,
Andreas Hofmann

**Project runtime:** 06/2012 – 05/2013

**Research associates:**

PLANNING / MODELING / SIMULATION

FACTS4STOPS

# Development of spatial information services for needs-appropriate connectivity of public transport stops and infrastructure

**In the FACTS4Stops (Facility And ConnecTivity information Services for public transport Stops) project, an innovative planning tool was developed with which the needs of the users in the public transport stop environment and the local infrastructure can be factored directly into the finding of measures for improving the needs-appropriateness of public transport stops.**

The quality of the stop in combination with its surroundings and accessibility is essential to the use of public transport modes. For users, the stop is not only a place to board, disembark or transfer, but also the emotional first contact with the public transport service. In FACTS4Stops, a web service was developed for transport and regional planners that enables a methodical comparison of the supply and demand of infrastructure for individual access ways in the public transport stop area. ÖV-Community Client provides an information service for mobile devices, which informs public transport users of options at the stop and its surroundings through intelligent integration of official data and social media services.

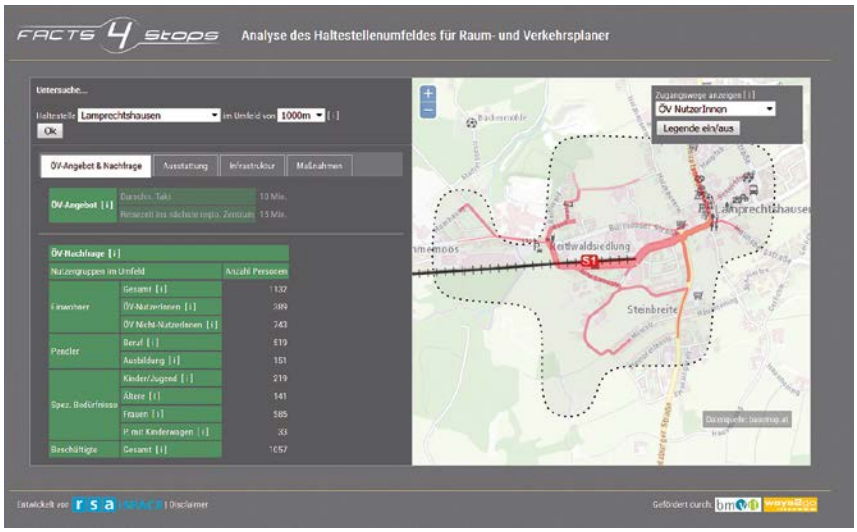
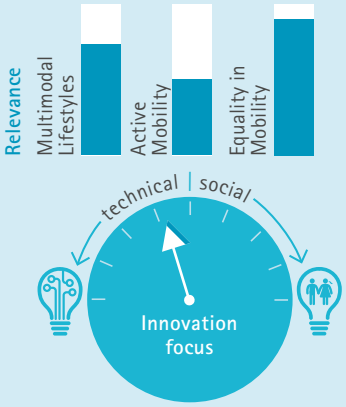



Figure: Prototype web service for transport/development planners (http://facts4stops.researchstudio.at)

*"Scarce resources make it necessary to prioritize investments in infrastructure and measures for quality improvement in public transport. FACTS4Stops shows where specific measures for increasing the needs-appropriateness of stops will be best employed. For the first time ever, an uncomplicated consideration of infrastructure, public transport service, and extensive regional needs is possible with the push of a button."*

Mag. Wolfgang Spitzer,
Research Studios Austria Forschungsgesellschaft mbH, Studio iSPACE

## Characterization




## Impact

With the information services, FACTS-4Stops shows how user needs can be identified in the region, how information on infrastructure and equipment can be acquired and evaluated with the help of public transport users, how needs-appropriate measures can be suggested during planning, and how this information can be made available to public transport users and for planning. The results support the integrative planning process that is necessary for making public transport attractive in a needs-appropriate manner.

## Implementation

The FACTS4Stops services were prototypically implemented in the territory of the Salzburg Transport Association, using the S1 local railroad as an example. Integration in planning processes was discussed in user workshops and is taking place via the subsequent MobilityOptimizer project (e.g., Salzburger Landesmobilitäts-konzept 2016-2025), among others.

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**Partners:**
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FACTUM Chaloupka&Risser OHG

**Project runtime:** 05/2012 – 12/2013

**Research associates:**

PLANNING / MODELING / SIMULATION

MOBILITYEQUALIZER

# Environments of mobility demand for therealization of equal-opportunity and needsappropriate mobility options

**The goal of the project is to develop demonstrable and regionally applicable results (tools) that can be used directly, in the sense of demand-oriented planning, for different decision-making levels (transport planning, regional planning, policy making).**

A coordinated planning in the regional and transport planning area requires integrative information and tools in order to be able to implement sustainable measures. In the MobilityEqualizer project, for the first time directly applicable indicators and tools were developed for different decision-making levels (transport planning, regional planning, policy making). These tools can be used to assist with equal-opportunity and needs-appropriate mobility options.

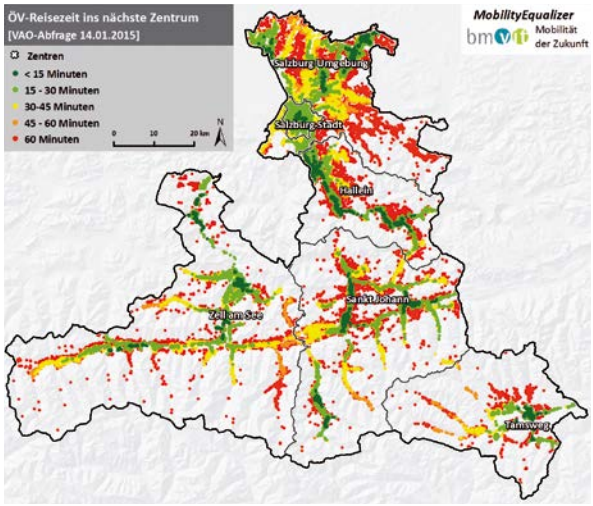


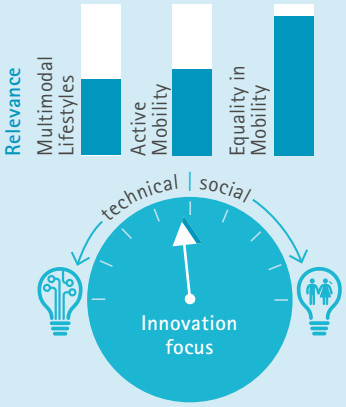

Figure: Public transport service example: travel times to the nearest regional center for the Province of Salzburg

To this end (and on the basis of preliminary projects), target group user demands in terms of public transport and alternative mobility offerings were specified and a catalog of mobility requirements of various groups (transport purposes) was compiled. This served as a basis for developing indicators (travel times, cycles) for the existing and future mobility demand and for the current public transport service. Lastly, a first prototype of an interactive web planning tool is integrating these components on different regional planning levels to assist with both supralocal public transport planning and sustainable urban development.

*"Regional development concepts and public transport standards demand greater coordination of regional planning and traffic planning measures. In MobilityEqualizer, innovative planning tools and indicators were developed for evaluating the quality of public transport services and minimum standards for urban centers and for providing planners with a transparent decision-making basis for public transport-oriented urban development."*

Mag. Stefan Herbst,
Research Studios Austria Forschungsgesellschaft mbH, Studio iSPACE

## Characterization




## Impact

Improved evaluations of public transport offerings enable better coordination of regional planning with public transport development. Comparing demand potentials with current public transport services enables better management of public transport planning. Conclusions regarding expedient expansions of public transport service are thus possible, which in turn are incorporated in calls for bids for future services.

## Implementation

A prototype web planning tool was implemented for the Province of Salzburg. This tool can be used to compare public transport services and the mobility demand on different regional planning levels (communities, urban centers, grid cells, public transport stop areas). Other results such as the extensive analysis of public transport qualities (see figure) are being used to evaluate the mobility concept of the Province of Salzburg, for example.

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**Project runtime:** 01/2014 – 07/2015

**Research associates:**

PLANNING / MODELING / SIMULATION

MOBILITYOPTIMIZER

# Practical tool for needs-appropriate planning of public transport services based on demand potential and user feedback

**The MobilityOptimizer project gave rise to a web-based, interactive planning tool that enables the integrative linkage and regional depiction of current public transport features, local demand potentials, and user feedback so that planning measures can be deduced and the service can be designed in an anticipatory manner.**

The aim of MobilityOptimizer is to support anticipatory, good quality planning in public transport with user-friendly planning instruments. Public transport development and public transport services should not be limited to a minimum in the rural sector, but instead should be oriented toward the achievable demand potentials and optimized accordingly. On the basis of topic-relevant preliminary projects and national public transport standards, new methods were developed in MobilityOptimizer in order to assess the demand for public transport and alternative mobility solutions realistically. To this end, the web service integrates both demand potentials and the public transport service (e.g., differentiated by time) on different regional levels (ranging from communities to individual stops) in order to support public transport planning in a concrete manner.

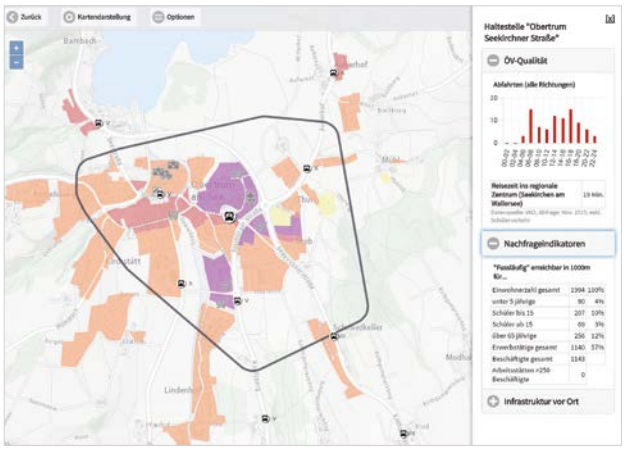


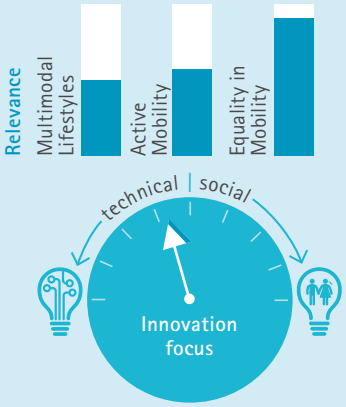

Figure: Querying of public transport service and demand indicators at the stop or in the pedestrian commuter area in the MobilityOptimizer web tool

A particularly important success factor is to include the population in the planning at this point and thus develop target group-oriented solutions. To this end, a feedback option was developed for public transport users in this project. This option is directly integrated in the planning tool by an interface. Public transport users will thus be able to convey feedback, wishes, and suggestions for improvement in structured form, which will be directly integrated in an optimized planning of services.

*"The 'MobilityOptimizer' transferable project funded by the BMVIT assists with the anticipatory designing of public transport services and with deducing target groupspecific transport planning measures. A nationwide innovative planning tool is being developed for the first time, which not only provides detailed accessibilities, demand potentials, and public transport service features but also a feedback option for public transport users. Feedback and suggestions for improvements from the people can thus be integrated directly in an optimized public transport service planning scheme."*

Mag. (FH) Allegra Frommer,
Geschäftsführerin Salzburger Verkehrsverbund GmbH

## Characterization




## Impact

The planning tools assist with specific planning in the areas of regional planning and transport. They are geographically transferable. Among other things, they provide a transparent and practicerelevant basis for creating a model to determine the accessibility situation and public transport quality grades throughout Austria. This in turn serves as a basis for implementing minimum standards for urban centers (under the responsibility of bmvit Department II/Infra 2).

## Implementation

The web planning service, which combines the components of public transport service, demand, and user feedback, was implemented for the Province of Salzburg. A long-term implementation is planned. In cooperation with the Salzburg Transport Association, the feedback tool integrated in the planning service is being implemented in practice and being evaluated with the Postbus public bus service (Line 150).

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**Project runtime:** 05/2015 – 10/2016

**Research associates:**

PLANNING / MODELING / SIMULATION

PARTIZIPATIONSTOOL 2

# Optimization of e-participation in infrastructure projects for overcoming process-induced barriers

**In the "Partizipationstool II" project, the goal was to develop integral prototype features (based in particular on the participation tool developed in the preliminary project) for creating the conditions in the eparticipation area that will allow gender and diversity aspects to be taken into account efficiently, economically, and as thoroughly as possible, as well as enable "mobile-local-availability" and a practical integration of supplementary technologies.**

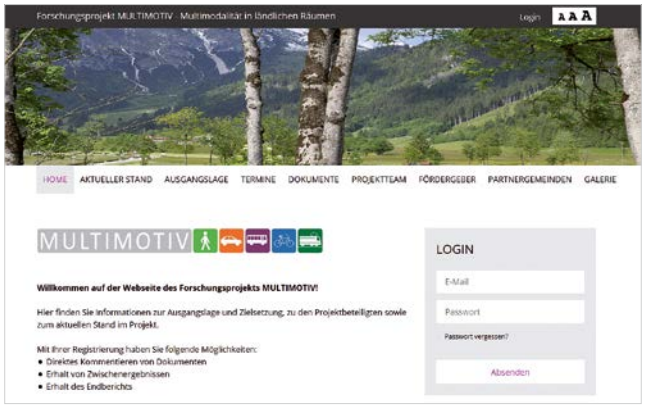


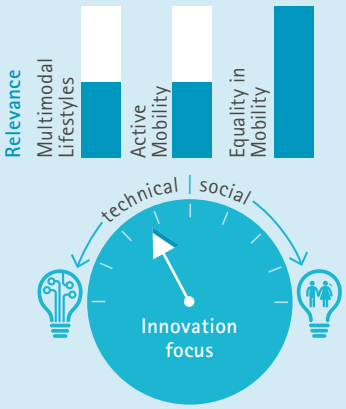

Figure: MULTIMOTIV project homepage, use of the participation tool

The further development of the participation tool from the preliminary project comprises three components: "mobile-localavailability", "gender and diversity", and "interfaces". The "mobile-localavailability" component comprised the solutions for making all data and information contained in the participation tool available in "local services" (in the sense of mobile devices) and useable locally in the specific planning area, thereby substantially improving the understanding of planning. The "gender and diversity" component included an in-depth and comprehensive study of different demands on eparticipation, with a clear focus on possible technology-based solution paths. It was also implemented prototypically. The "interfaces" aspect contains a broad as well as international spectrum of external providers of components in the context of eparticipation.

*"The participation tool should not and cannot replace physical encounters in participation processes. Instead it is a tool for accompanying and supporting participation processes on all conceivable levels of our society. One of the strengths of the tool lies in the individually adaptable scope of use of the developed components such as the schedule management system, the document management system, the contents management system or the comment system (of schedules and documents) via login. A newsletter tool, a bulletin board & guestbook function without login, the picture and gallery functions, including slideshows and the incorporation of multimedia files (sounds, videos, etc.) can also be used individually, depending on the project requirements."*

DI Dr. Alexander Neumann, netwiss

## Characterization




## Impact

An implementation has the potential to contribute towards user-appropriate, sustainable, barrier-free and socially appropriate mobility for all population groups. These goals will be achieved through a substantially improved and planning-relevant understanding of the needs of relevant population groups.

## Implementation

The "Partizipationstool II" project is making a significant contribution towards the fulfillment of current and future societal demands and needs in the context of mobility- and infrastructurerelevant projects. The participation tool has already been used successfully in a large mediation in Vienna. The participation tool is likewise accompanying and supporting other R&D projects with participative approaches such as the MULTIMOTIV project, for example.

**Contact:**
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one's own,
JOANNEUM RESEARCH Forschungsgesellschaft mbH,
mediative solutions OG

**Project runtime:** 10/2012 – 09/2014

**Research associates:**

PLANNING / MODELING / SIMULATION

PROVAMO

# Prototypes for a valid and automatic mobility survey with mobile terminal devices

**In the PROVAMO project, a prototype system was developed for mobile terminal devices in order to collect better mobility data from the population, with as little demand as possible placed on the survey takers and at low cost.**

Information on the everyday mobility behavior of individuals (e.g., number of routes taken, travel times, or choice of transport mode) are very important to transport and regional planners. The findings from mobility surveys provide valuable content for optimizing transport services in terms of a best possible coordination with the transport demand, and for optimizing infrastructure in terms of appeal and efficiency.

In the PROVAMO project, a prototype system was developed for automatically collecting mobility data with mobile terminal devices. In order to achieve this, know-how and technology developments from six preliminary projects were combined and further developed. The common technologies from this portfolio were used to create and test a prototype in two variants (smartphone and passive tracking device) for the purpose of collecting mobility data from mobile terminal devices in an innovative manner. The subsequent data quality analysis and the findings from an online survey of user acceptance revealed both very promising results and useful recommendations for future technology-based surveys.

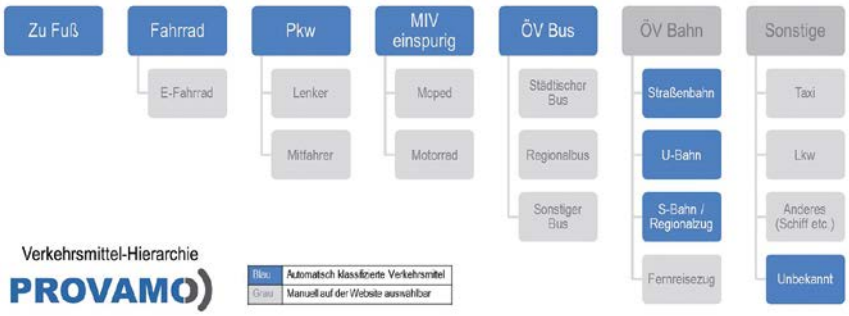
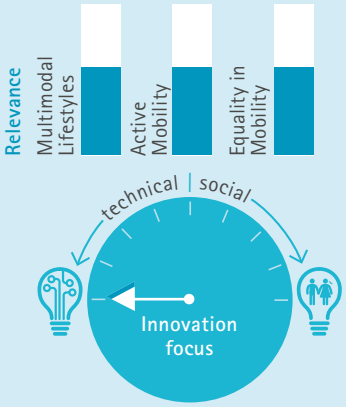



Figure: The transport modes included in PROVAMO, in which eight transport modes (walking, bicycle, car, single-lane motorized private transport, public bus, trolley, subway and suburban train (S-Bahn)) are automatically detected.

*"We are very proud that we are able to provide an elegant and robust technology with the method for future mobility surveys that we developed. In the field test with 97 test subjects, approx. 90 % of the route stages were automatically assigned to the correct transport mode, thereby considerably reducing the effort required for manual post-processing."*

DI, Philippe Nitsche, MSc.,
AIT Austrian Institute of Technology GmbH

## Characterization




## Impact

The solution developed in the project will enable a continuously updated surveying of the mobility of travelers, thus improving the databases for regional and transport planning. Accordingly, the primary target groups of the project include mobility planners, transport planners, researchers, infrastructure operators, public transport operators (Wiener Linien, ÖBB [Austrian National Railroad], etc.), insurance companies, municipalities and towns as infrastructure operators, etc.

## Implementation

Potential areas of use are
1) supplementing and validation of an Austria-wide mobility survey, which uses conventional methods (written/mail, telephone),
2) determination of weighting factors for "under-reporting" and
3) addressing specific issues in the mobility research field.

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easyMOBIZ mobile IT solutions GmbH,
Universität für Bodenkultur Wien – Institut für Verkehrswesen,
verkehrplus – Prognose, Planung und Strategieberatung GmbH

**Project runtime:** 09/2012 – 02/2015

**Research associates:**

PLANNING / MODELING / SIMULATION

ROPEWAY POT

# Potential of an urban cableway in multimodal urban transport

**The goal of the project is to determine, on the basis of a transport model, the passenger carrying potential of a cableway system serving as an integral part of the local public transport service in the metropolitan area of Graz.**

With increasing urbanization, more and more transport systems worldwide are reaching the limits of their capacity. This project focused on the determination, using a demand model as a basis, of the passenger carrying potential of a cable car system serving as an integral part of the public local transport service in urban areas. The City of Graz was used as an example in this project. The methodology for the transport model-based determination of the demand potential of an urban cableway system was divided into five steps. The first and seconds steps consisted of a multi-phase mobility survey and the analyses of the results thereof. In the subsequent third step, enhancements had to be made to the existing calibrated transport model. The priority here was the integration of the cableway system in the existing calibrated transport model of Styria. On the basis of a prognosis, the passenger potential for different planned scenarios was determined in the fourth step, and the impact of the cableway system was evaluated in the last step.

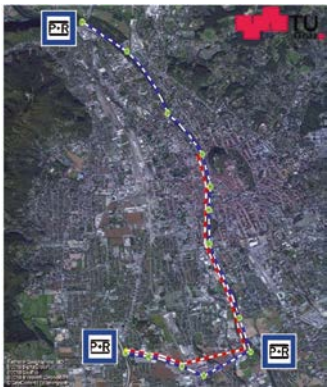


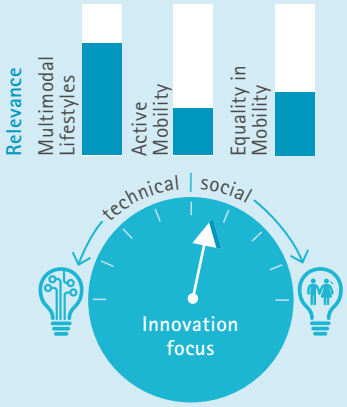
Figure: The route of a short and a long variant of the planned case runs from the north to the south of the city and essentially follows the course of the Mur river.

By using surveys specifically adapted to the residential population, commuters and tourists in Graz, key findings were obtained on the mobility behavior and the transport mode selection behavior of these groups if an urban cableway were available. The integration of the cableway system and the modeling of the mode choice based thereon were key elements in the enhancements of the transport model. These results confirm that an urban cableway has potential within the increasingly multimodal urban transport system in Graz. The model results indicate that the cableway is not only interesting from a tourism stndpoint, but also that commuters and the urban population would be important user groups if the cableway were fully integrated in the local public transport system. However, statements as to whether the implementation of the new cableway transport system would be worthwhile cannot be made solely on the basis of demand figures from models. An in-depth macroeconomic analysis of the planned scenarios would make it possible to determine whether investing in a cableway system makes sense from a macroeconomic standpoint.

*"The carrying capacities of an urban cableway (as many as 5,000 passengers per hour and direction) are comparable to those of trolley lines that make very frequent runs. Furthermore, the modeled passenger transport events on the lines of the various planned scenarios and route variants at times exceed 33,000 runs on workdays. They are thus able to compete with the counted passenger transport events of Graz trolley lines."*

Haberl Michael, Dipl.-Ing. BSc.,
Institut für Straßen- und Verkehrswesen, TU Graz

## Characterization




## Impact

Reliable line transport figures for different variants of an urban cableway system in the City of Graz could be calculated from these project results. These line transport figures can now be used to perform in-depth analyses on the feasiblity of an urban cableway.

## Implementation

In-depth macroeconomic analyses of the planned scenario results of this project are being pursued in order to determine whether investing in a cableway system makes sense from a macroeconomic standpoint. Furthermore, the cableway system has potentials for transporting goods as an integral part of the "last mile" in urban areas. These potentials need to be looked into.

**Contact:**
Kurt Fallast, DI Dr. techn. Ass. Prof.,
IBV Fallast – Ingenieurbüro für Verkehrsplanung und Umweltplanung

**Partners:**
Institut für Straßen- und Verkehrswesen – Technische Universität Graz,
Holding Graz – Kommunale Dienstleistungen GmbH

**Project runtime:** 03/2015 – 05/2016

**Research associates:**

PLANNING / MODELING / SIMULATION

SOMOBIL

# Improvement of public transport service on a mobility-oriented basis

## On the basis of floating phone data and household data, solution concepts relating to individual requirements were developed for improving the public transport service.

The user-appropriate planning of public transport in regions is a key requirement for achieving suitable connectivity and attractiveness in the face of changing framework conditions. Data on transport modes such as source/target relationships or desired lines in geographically isolated areas are currently insufficient. To remedy this, floating phone data were used in SOMOBIL as a comprehensive basis, thus enabling the analysis of large-scale transport relationships at a reasonable economic expense.

With consideration given to floating phone data in coordination with other available transport and mobility data and in collaboration with experts from the Austrian provincial governments and transport associations, methods were developed for creating user-appropriate planning solutions for public transport. The information thus obtained was used to create planning solutions with specific planning measures that fit the requirements (which were in turn classified according to traffic periods and user groups).

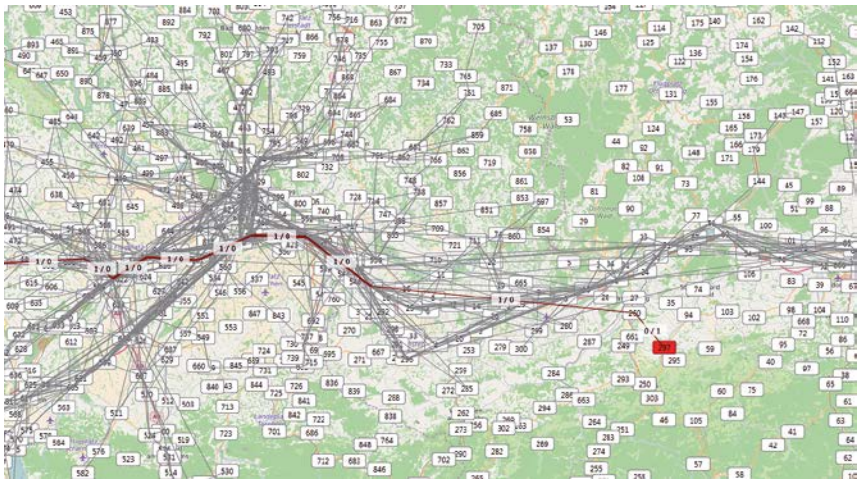
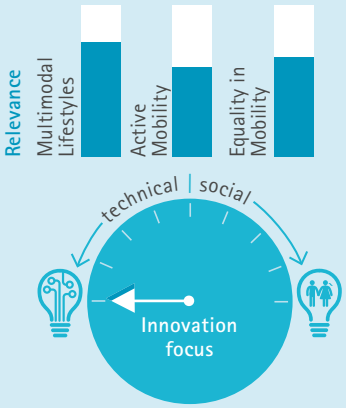


Figure: Prototype screenshot for analyzing and depicting floating phone data

*"The use and analysis of floating phone data for the planning process in the transport sector (using SOMOBIL for public transport as an example) constitutes a substantial enrichment for the creation of concepts and for mobility planning based thereon, provided that current data sets are available. Very good correlations between household surveys and floating phone data were established for the regional zone on the basis of the comparisons with household data from the Office of the Upper Austrian Provincial Government."*

DI Daniel ELIAS, nast consulting ZT GmbH

## Characterization




## Impact

The increasing changes in the mobility area on the part of different user groups require a dynamic consideration of the requirements and interactions in the transport system and the areas activity associated therewith. As a general rule, the databases needed for this are only available to transport service providers and the public sector to a limited extent. Hence if floating phone data were available, a decisive expansion of the databases would be possible for the public transport sector.

## Implementation

Specific measures suggested for different study areas for optimizing public transport services and linking them to other modes of transport were examined in the scope of the study. For data analysis purposes, a prototype was developed that automatically analyzes the floating phone data in stepwise fashion. This protype can also display the results visually, with corresponding search and selection functions taken into account.

**Contact:**
DI Daniel ELIAS, nast consulting ZT GmbH

**Partner:**
FH OÖ Forschungs- und Entwicklungs-GmbH

**Project runtime:** 02/2014 – 09/2016

**Research associates:**

PLANNING / MODELING / SIMULATION

VOR-RIDER

# Social media communication as a basis for a needs-oriented and effective planning of student traffic

**The goal of the VOR-Rider research project was that of building customer relationships in the public transport sector through the use of social media, and using new methods to obtain information on the actual mobility needs of travelers.**

Figure: Laa/Thaya trade school students filling out the final VOR-Rider questionnaire

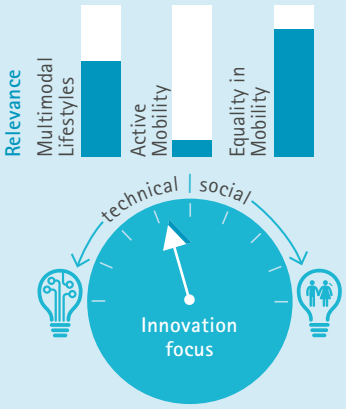
The planning of student transport poses a challenge to the Public Transport Association Eastern Region (VOR by its German initials). This is so because in recent years, the framework conditions in student transport have undergone some substantial changes: On the one hand, the presence of students at school is extending to the afternoon to an increasingly greater extent because of the development of afternoon care and the introduction of all-day forms of school. Consequently, the time periods in which children and adolescents need suitable bus and train connections in order to get home are likewise being prolonged into the late afternoon. The decline of boarding schools, the less stringent school district regulations, and the prioritizing of schools are also leading to longer ways to schools. On the other hand, the database for estimating student travel has become inadequate since the introduction of the convenient year network ticket for the entire transport association (Top Youth Ticket). Whereas the former free travel applications required information on the home address, school address, and modes of transport used and thus made it possible to show source/target relationships, information about the way to school is no longer required to buy a Top Youth Ticket. The planning bases for the Public Transport Association Eastern Region have therefore clearly deteriorated. At the same time student transport is a topic with a presence in public perception. Any negative cases could therefore draw sharp criticism from the media.

In the face of this starting situation, the VOR-Rider research project resorted to new methods: In the first phase, a study was conducted to determine how a customer relationship could be established with the students via social networks and a website with assignments on the topic of "public transport" and regular awarding of prizes. In the second phase, the participants were provided with an app that was developed specifically for this project for recording the routes actually taken.

*"The greatest hurdle in this project lay in motivating the students to participate. The basic premise that gamification is the only way to motivate students to cooperate in a thematic field such as this proved to be unfounded. To the contrary, we underestimated the students in this regard. In fact valuable feedback was obtained on specific issues without accompanying 'staging'."*

Dipl.-Ing. Ulrike Brocza, PRISMA solutions

## Characterization




## Impact

The project provided important information as to which (new) methods are suitable, or not, for assessing mobility needs and satisfaction. Individual offerings such as the public transport feedback site yielded results that could be evaluated contentwise and thus contribute towards concrete improvements to the service. It was thus concluded that the students were clearly more satisfied with the public transport service than was assumed and that an alternative data source must be used to solve the current planning issues.

## Implementation

Experiences from the VOR-Rider project led to the idea of a schedule analysis tool. In collaboration with PRISMA solutions and VOR (Traffic Association Eastern Region), a software was developed that evaluates schedules according to mobility needs in terms of time (ways to and from school). VOR is presently (September 2016) testing the application.

**Contact:**
Dipl.-Ing. Ulrike Brocza, PRISMA solutions

**Partners:**
Verkehrsverbund Ost-Region,
Liechtenecker GmbH,
myVision network

**Project runtime:** 02/2014 – 11/2015

**Research associates:**

# Other cooperative research and development projects still underway:

## AWARENESS RAISING / BEHAVIOR CHANGE

### Bike'N'Play
**Persuasive concepts for integrating bicycle mobility data in computer games of different genres**

**Contact:** Mag. BSc Elke Mattheiss
**Organization:** AIT Austrian Institute of Technology GmbH
**Partners:** FH OÖ Forschungs & Entwicklungs GmbH,
FLUIDTIME Data Services GmbH,
Austrian Players League - Verein zur Förderungvon Jugendlichen im IT und EDV Bereich,
ovos media gmbh

### FiF
**"Frauen in Fahrt" [Women Underway]**

**Contact:** Dr. Astrid Segert
**Organization:** Institut für Höhere Studien Wien (IHS)
**Partners:** Interessensgemeinschaft Fahrrad,
Verein Piramidops,
Institut für Frauen- und Männergesundheit

## INFORMATION / NAVIGATION

### INK 2016
**Indoor Navigation and Communication in the Local Public Transport System for Visually- and Hearing-impaired Persons**

**Contact:** Ao.Univ.-Prof. Dr. Manfred Wieser
**Organization:** Technische Universität Graz - Institut für Geodäsie / Arbeitsgruppe Navigation
**Partners:** c.c.com Moser GmbH,
FH JOANNEUM Gesellschaft mbH,
Holding Graz Kommunale Dienstleistungen GmbH,
init,
Karl-Franzens-Universität Graz - Zentrum Integriert Studieren,
TAF mobile GmbH,
Hilfsgemeinschaft der Blinden und Sehschwachen Österreichs,
Odilien-Verein zur Förderung und Betreuung Sehbehinderter und Blinder Steiermarks

### PERRON
**Enhanced Pedestrian Routing and Navigation as well as Quality Management of Pedestrian Ways**

**Contact:** Mag. Stephanie Schwarz
**Organization:** AIT Austrian Institute of Technology GmbH
**Partner:** FLUIDTIME Data Services GmbH

### ways2see
**A GIS-based digital information platform for visuallyand hearing-impaired persons**

**Contact:** Prof. Dr. Susanne Zimmermann-Janschitz
**Organization:** Universität Graz - Geographie und Raumforschung
**Partners:** SynerGIS Informationssysteme GmbH,
Odilien-Verein zur Förderung und Betreuung Sehbehinderter und Blinder Steiermarks

## NEW MOBILITY SUPPLY AND SERVICES

### coop:mob
### Cooperative trans-generational models of mobility in peripheral regions

**Contact:** Dr. Christine Chaloupka-Risser
**Organization:** FACTUM Chaloupka & Risser OHG
**Partners:** tbw research GesmbH,
Dipl. Ing. Alexander Fürdös

### Dementia in Mobility
### Study and recommended actions for dementia-friendly circulation in the public transport system

**Contact:** Prof. Dr. Elisabeth Reitinger
**Organization:** Alpen-Adria Universität Klagenfurt Wien Graz – IFF-Palliative Care und OrganisationsEthik
**Partners:** B-NK GmbH,
CS Caritas Socialis,
Wiener Linien

### Easy Travel
### New mobility concepts in tourism

**Contact:** Univ. Prof. Dr. Markus Mailer
**Organization:** Universität Innsbruck - Institut für Infrastruktur, Arbeitsbereich Intelligente Verkehrssysteme
**Partners:** netwiss,
FH OÖ Forschungs & Entwicklungs GmbH,
Technische Universität Wien - Institut für Verkehrswissenschaften,
Ötztal Tourismus,
Ötztaler Verkehrsgesellschaft m.b.H,
komobile w7 GmbH,
Tirol Werbung,
Tiroler Zukunftsstiftung

### flexiTrike
### Versatile set of measures for persons getting (back) into cycling

**Contact:** Dr. Christian Rudloff
**Organization:** AIT Austrian Institute of Technology GmbH
**Partners:** City Cycling School,
Paris Maderna KG,
INSEQ DESIGN illera + Partner OG,
Wolff, MA Valerie,
Vodev, Mag.Art. MA RCA Valentin

### GISMO
### Geographical information support for healthy mobility

**Contact:** Dr. Bernhard Zagel
**Organization:** Universität Salzburg - IFFB Geoinformatik – Division Networks and GI Society
**Partners:** SALK - Gemeinnützige Salzburg,
Landeskliniken Betriebsgesellschaft mbH,
Herry Consult GmbH,
Research Studios Austria,
Forschungsgesellschaft mbH,
TraffiCon - Traffic Consultants GmbH,
Universität Zürich - Klinik für Kardiologie

## NEW MOBILITY SUPPLY AND SERVICES

### MICHAEL
### MIkro-ÖV und CarsHAring ELegant verknüpfen

**Contact:** Prof. Dr. Michael Berger
**Organization:** TU Wien - FB Verkehrssystemplanung | Department für Raumplanung
**Partners:** CARUSO Carsharing eGen,
Zemtu

### MobiHelfer II
### Mobility escort for supporting equality in mobility specifically for non-routine paths

**Contact:** DI Dr. Bernhard Rüger
**Organization:** netwiss
**Partners:** equality,
IT-eXperience Informationstechnologie GmbH,
Technische Universität Wien - Institut für Verkehrswissenschaften,
Vereinigung sehbehinderter Menschen,
Wiener Hilfswerk,
WU-Wien - Institut für Transportwirtschaft und Logistik

### mobilTIMES
### Concepts for multifunctional use of the mobility time budget

**Contact:** DI Dr. Edeltraud Haselsteiner
**Organization:** DI Dr.Edeltraud Haselsteiner
**Partners:** TU Wien - Institut für Verkehrswissenschaften,
Havel & Havel BeratungsGesmbH,
Lechner, Reiter & Riesenfelder Sozialforschung OG,
ÖBB-Postbus GmbH

### ROUTINE
### Fitness trip planners for everyday mobility to promote physical activity

**Contact:** Univ.-Doz. Prof. Dr. Ralf Risser
**Organization:** FACTUM Chaloupka & Risser OG
**Partners:** Verkehrsverbund Ost-Region (VOR) Ges.m.b.H.,
TraffiCon - Traffic Consultants GmbH,
Universität Graz - Institut für Sportwissenschaft

### SynArea II
### Synergetic site development with public transport and lowthreshold short distance private transport II

**Contact:** DI DI Dr.techn. Gerald Kelz
**Organization:** AMSD Advanced Mechatronic System Development KG
**Partners:** komobile w7 GmbH,
ÖBB Personenverkehr Aktiengesellschaft,
Technische Universität Graz - Institut für Fahrzeugsicherheit,
AIT Austrian Institute of Technology GmbH

## NEW MOBILITY SUPPLY AND SERVICES

### TransportBuddy
**Autonomous vehicle to support active mobility**

**Contact:** DI (FH) Dr. Stefan Seer
**Organization:** AIT Austrian Institute of Technology GmbH
**Partners:** bkm design working group,
Blue Danube Robotics GmbH,
DS Automation GmbH,
Technische Universität Wien - Institut für Rechnergestützte Automation

### WAY-KEY
**Mobility assistent for persons with dementia**

**Contact:** Ao Univ.Prof. DI Dr. Peter Purgathofer
**Organization:** Technische Universität Wien - Institut für Gestaltungs- und Wirkungsforschung / Zentrum für Angewandte Assistierende Technologien
**Partners:** AccessibleMap Association,
Akademie für Altersforschung am Haus der Barmherzigkeit,
ilogs mobile softwareGmbH,
TeleConsult Austria

## PLANNING / MODELING / SIMULATION

### ACTIV8!
**Efficient Promotion of Active Mobility**

**Contact:** DI. Marlene Hawelka
**Organization:** tbw research GesmbH
**Partners:** Herry Consult GmbH,
Research & Data Competence OG,
Technische Universität Wien - Department für Raumplanung, FB Stadt- und Regionalforschung

### BIKEALYZE
**Evaluation of methods for analyzing the interaction of cyclists with their environment**

**Contact:** Mag. Sven Leitinger
**Organization:** Salzburg Research Forschungsgesellschaft m.b.H.
**Partners:** Prisma solutions EDV-Dienstleistungen GmbH,
FACTUM Chaloupka & Risser OHG,
PlanSinn Büro für Planung und Kommunikation GmbH,
Universität Salzburg - IFFB Geoinformatik - Division Networks and GI Society

## PLANNING / MODELING / SIMULATION

### FamoS
**Bicycle transport models as planning instruments for reorganizing road space**

**Contact:** DI. Dr. Birgit Kohla
**Organization:** TU Graz - Institut für Straßen- und Verkehrswesen
**Partners:** BikeCityGuide Apps GmbH, PTV Austria Planung Transport Verkehr GmbH, Sammer und Partner ZT GmbH (ZIS+P Verkehrsplanung), Universität Salzburg - IFFB Geoinformatik - Division Networks and GI Society

### GOGreen
**Impact of greening of urban areas on active mobility**

**Contact:** Dr. Christine Chaloupka-Risser
**Organization:** FACTUM Chaloupka & Risser OHG
**Partner:** MK Landschaftsarchitektur, Ingenieurbüro für Landschaftsplanung und Landschaftsarchitektur

### MatchSim
**Multi modal trip chain simulation for individual daily routines**

**Contact:** Dr. Georg Kriebernegg
**Organization:** IKK Kriebernegg-Kaufmann ZT-GmbH
**Partners:** AIT Austrian Institute of Technology GmbH, TU Graz - Institut für Straßen- und Verkehrswesen, Wiener Linien

### MULTIMOTIV
**MULTIMODALITY TOOL FOR RURAL AREAS**

**Contact:** DI Dr. MA MSc Alexander Neumann
**Organization:** netwiss
**Partners:** TU Wien - FB Verkehrssystemplanung | Department für Raumplanung, FACTUM Chaloupka & Risser OHG, komobile w7 GmbH, pn-venture OG, komobile Gmunden GmbH

### PlanBiss
**Site planning for bike sharing systems, with demand, redistribution, and maintenance taken into account**

**Contact:** DI Markus Pajones
**Organization:** FH OÖ Forschungs & Entwicklungs GmbH
**Partners:** AIT Austrian Institute of Technology GmbH, Technische Universität Wien - Institut für Computergraphik und Algorithmen, Rosinak & Partner ZT GmbH

## PLANNING / MODELING / SIMULATION

### SIMMARC
**Safety IMprovement Using Near Miss Analysis on Road Crossings**

**Contact:** DI. Helmut Neuschmied
**Organization:** JOANNEUM RESEARCH Forschungsgesellschaft mbH
**Partners:** PLANUM Fallast Tischler & Partner GmbH, Siemens AG Österreich, University of Žilina - ERA Chair in Intelligent Transport Systems

### ULTIMO
**Identification of multimodal lifestyles with innovative survey technologies**

**Contact:** Univ.Prof. Dipl.-Ing. Dr. Regine Gerike
**Organization:** Universität für Bodenkultur Wien - Institut für Verkehrswesen
**Partners:** Omnitrend GmbH, Snizek + Partner Verkehrsplanungs GmbH, AIT Austrian Institute of Technology GmbH

### VR-Planning
**Virtual reality for participative planning and evaluation of needs-appropriate and active mobility environments**

**Contact:** DI Helmut Schrom-Feiertag
**Organization:** AIT Austrian Institute of Technology GmbH
**Partners:** PlanSinn Büro für Planung und Kommunikation GmbH, Langkamp-IT e.U., Fraunhofer Austria Research GmbH, ostertag architects zt gmbh, Wien 3420 Aspern Development AG

Further details on the exploratory studies in progress can be found at: www.ffg.at/verkehr.

# 4.
# Exploration.
# Sounding out.

**In addition to research and development initiatives, exploration is also subsidized in Mobility of the Future. The purpose of exploration is to investigate the potential of ideas for continuing and more in-depth research and development initiatives, the potential of implementing such initiatives or of carrying out preparatory studies of the relevant framework conditions and situations. Exploration often leads to cooperative research and development projects or broadens the knowledge base in the thematic field.**

AWARENESS RAISING / BEHAVIOR CHANGE

MIGRAD

# Women migrants master the bicycle

**The research project explored the potential need for everday cycling among women from non-EU Member States, the willingness in the target group to make a personal financial investment, the role played by health/illness in cycling, the potential barriers to everyday bicycle use. Women migrants participated in the project. The goal was to explore opportunities for sustainable innovative bicycle services for women migrants and to gather target group-specific ideas.**


Figure: Depiction of the incentives, opportunities, and barriers for women migrants to use bicycles

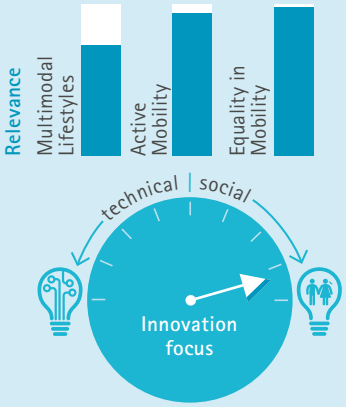
The participation of women migrants in bicycle transport is below average at present. There has hardly been any research on the reasons for this and on possible conditions for promotion. The project helped fill this research gap and develop target group-appropriate promotion modules. In the project, women from Turkey, Afghanistan, Pakistan, Somalia, Nigeria, Ethiopia, Kosovo, Serbia, Chechnya, and Bosnia were asked about their biographical mobility experiences by means of qualitative interviews, focus groups, and a short questionnaire. In addition, the correlation between health and active mobility in the target group was analyzed in a workshop with healthcare experts. Also, women migrants participating in cycling courses were observed and asked about their experiences and additional mobility wishes.

The results of the study confirmed that the interest of women migrants in cycling is much more widespread than previously thought. It was also confirmed that cycling by women migrants from non-EU Member States is hindered by diverse overlaying socio-economic and cultural barriers (see figure). A major hindrance lies in the fact that many women never had a chance to learn to ride a bicycle in their childhood and in that they do not have access to their own bicycles. The latter also applies even when the women have subsequently learned to ride a bicycle as adults by taking a cycling course. In the current follow-up project, it is being studied whether bike sharing services can be used to make access to cycling easier for women migrants interested in cycling but who do not (cannot) buy a bicycle of their own.

*"If the bicycle transport percentage is to be significantly increased, then target group-specific promotion offerings are indispensable. Women migrants from non-EU Member States form such a group of people who are interested in cycling, but who have hardly been studied at all."*

Dr. Astrid Segert, Institut für Höhere Studien Wien (IHS)

## Characterization




## Impact

The expertise acquired in the project was passed on to diverse organizations which deal with mobility and/or with integration. These include the mobility agency, WiG, diverse women migrants associations, the ÖAMTC [Austrian Automobile, Motorcycle, and Touring Club] and diverse working groups. The documentation of lasting needs for cycling courses among women migrants as well as the demonstration of further needs for promotion supported the designing and conceptual work of organizations that promote cycling. Cooperation relationships have arisen, which now provide stakeholders who promote cycling with scientific expertise and will continue to do so in the future.

## Implementation

The Mobility Agency Vienna, bolstered by the results from the exploratory study, is striving for sustainable promotion structures for cycling courses in Vienna beyond those of the previous pilot phase. In Vienna there are now two providers that offer cycling courses for women migrants: Radlobby and ÖAMTC. Migrant associations arrange for interested women migrants to take these cycling courses.

**Contact:**
Dr. Astrid Segert,
für Höhere Studien Wien (IHS)

**Partners:**
IG Fahrrad, Caritas der Erzdiözese Wien, Caritas Bildungszentrum, Institut für Frauen- und Männergesundheit

**Project runtime:** 02/2014 – 02/2015

**Research associates:**

AWARENESS RAISING / BEHAVIOR CHANGE

WAYS2TALENTS

# "Student Laboratory" Feasibility Study on the Promotion of Young Talent in IVTS

**In the "ways2talents" project, the potential of the "Student Laboratory" best practice model for sustainably promoting young talent for the intelligent transport technologies and systems (IVTS by its German initials) sector in Austria was investigated. On the basis of the criteria of successful mediation outside school and appealing IVTS topics, the feasibility was demonstrated by using an implementation concept with illustrative experiments.**

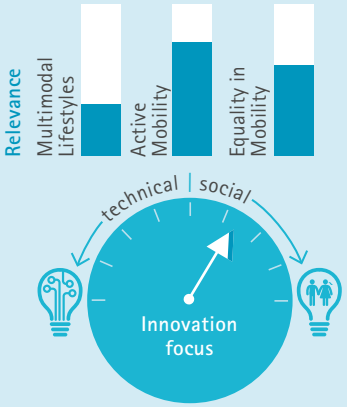
In the face of new challenges in the mobility system (concentration of the population in metropolitan areas, achievement of the climate objectives, assurance of mobility for all population groups, etc.), information and communication technologies are being used to design transport so that it runs smoothly, is safe, and low in harmful emissions. These 'intelligent' transport technologies and systems (IVTS) are being used to an inceasingly greatr extent in mobility management, and they represent a futureoriented segment of the transport sector. Hence a very promising labor market is opening up in the IVTS area, in which there is a real need of workers with technical skills. However, few young people are interested in the subject of transport and are hardly likely to consider it as a potential career or field of study.

The main goals of student laboratories are to promote interest and young talent. Not only students but also teachers and researchers benefit from this. Teachers gain important insights into current research and development areas in science and technology, which they can incorporate in their courses ("keep up with the times"). Because the experiments are applicable to the real world and through interactions outside of school, they can also expect the image of "their" profession to improve. Scientists become familiar with different methods for vividly imparting their research findings to a young target public. And by acting as role models, their research and development work becomes incorporated in science and technology instruction.

*"Transport and mobility systems are only truly 'intelligent' if we develop them together. Attractive 'room' for young people to experiment and participate is likewise needed."*

Mag. Petra Wagner, AIT Austrian Institute of Technology GmbH

## Characterization




## Impact

In comparison to classroom instruction, the learning gain is greater interest in the area of mobility and transport concepts and awareness raising rather than clearly defined, accessible knowledge. In this context, the student laboratories serve as instruments for promoting interest and young talent.

## Implementation

In the scope of a national call for bids in the thematic field of "intelligent mobility", nine projects were selected from different types of schools (and hence from all age groups), in order to explore the possibilities and/or potential hurdles in terms of the implementation, which took place in cooperation with partners from business or research. The topic diversity provided connecting points for different interests, which often led to additional voluntary activities or to the inclusion of additional partners.

**Contact:**
Mag. Petra Wagner,
AIT Austrian Institute of Technology GmbH
Innovation Systems Department

**Project runtime:** 04/2012 – 03/2013

**Research associates:**

INFORMATION / NAVIGATION

PHOBILITY

# Participation of people with mental illnesses, in particular phobias, anxiety and obsessive/compulsive disorders, in transport

**In this project, the participation of people with phobias, anxiety and obsessive/compulsive disorders in private and public transport was studied in Austria for the first time. Research was conducted on the physical, psychological, and social barriers to equal-opportunity participation in transport.**

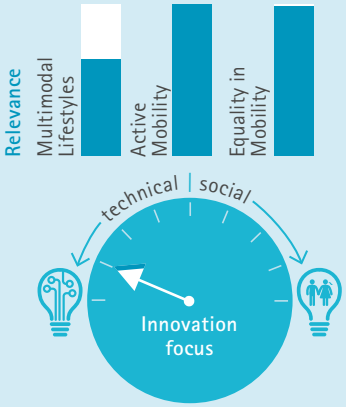
In this project, the participation of people who suffer from phobias, anxiety or obsessive/compulsive disorders in transport was studied in Austria for the first time. According to estimates (Kasper and Kapfhammer 2009, Wancata et al. 2011, Max Planck Institute 2016), between 10 % and 25 % of the general population are affected by such disorders. A mix of methods was chosen from individual case studies and group discussions with the target group of affected persons, as well as from expert interviews and an expert workshop. The core element of the project consisted of individual case studies (combination of problem-centered interviews, GPS surveys and road inspections). This served as a basis for understanding and explaining both the individual opportunities for and the restrictions to participation in transport by persons with anxiety or obsessive/compulsive disorders. The group discussions served as a supplement to the case studies (complementary use) and for validating the plausibility of and examining the mobility barriers and coping strategies. The findings were discussed with transport and healthcare experts, and specific ways of implementing practices and measures were worked out.

Not only physical and psychological structures, but also the lack of information, can lead to persons affected believing that they cannot control the situation. The presence of other people can also trigger this effect. In order to enable an adequate participation for persons thus affected, any fears that may arise in connection with transport participation must be sufficiently controllable. Because of their anxiety disorder, many such persons (sometimes completely) withdraw from social and

*"A barrier-free transport system that makes equal opportunity mobility possible for all social groups is one of the fundamental principles of a modern democratic community. In order to assure adequate transport participation for those affected, any fears that may arise in connection with transport participation must be sufficiently controllable. Affected persons and healthcare and transport professionals alike view diverse selfdiversion, self-calming, and self-manipulation tools along with planning and travel information as the most essential and feasible solution approaches, as they are a means for reducing fears."*

Mag. Ulli Röhsner, MAKAM Research GmbH

## Characterization




## Impact

With the aid of the project, it was possible to find ways and formulate mechanisms for assisting the target group in being able to take part (again) in social life – and consequently in transport as well.

## Implementation

First a foundation for later innovative transport concepts for this rapidly growing target group was developed in collaboration with healthcare institutions and transport companies in the study. A follow-up project was then submitted to the FFG (Austrian Research Promotion Agency). The goal of that project was to develop an app that provides affected persons with different options for overcoming their fears as needed, thus strengthening the autonomy of the users.

**Contact:**
Mag. Ulli Röhsner,
MAKAM Research GmbH

**Partners:**
Psychosoziale Zentren GmbH,
TU Wien - FB Verkehrssystemplanung | Department für Raumplanung

**Project runtime:** 04/2015 – 03/2016

**Research associates:**

NEW MOBILITY SUPPLY AND SERVICES

AVESTRA

# Analysis of autonomous transport systems in urban areas

**The AVESTRA project comprises the analysis of autonomous transport systems that address future urban transport in the context of increasing traffic volume, demographic change, safety, efficiency and environmental compatibility.**

Figure: 3D depiction of a control-free hub

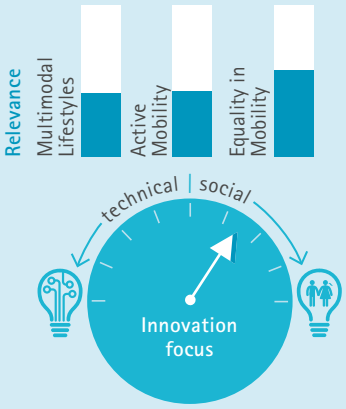
Owing to the increase in capacity, safety, and comfort, purely autonomous driving in motorized private transport has great potential for the future, although the very complex nature of the problem will require a few more years of R&D work before series production can commence. The potentials as well as the challenges of purely autonomous transport systems, the purpose of which is to combine the advantages of private transport and public transport, were anylyzed in AVESTRA. To this end, a closed traffic network was developed for autonomous vehicles. Existing fully and semi-automatic vehicle systems served as a basis for defining private transport-like and public transport-like vehicle types (minibus, 2- and 5-seat car). A track system was designed specifically for these vehicles. This track system consisted of elevated roads that were interconnected with gradeseparated junctions. The roads were divided into three different route types (primary, secondary, tertiary). Private transport- and public transport-like vehicles travel on primary and secondary routes at target speeds of 80 km/h and 50 km/h, respectively. Stops for public transport-like "podcars" are located on the secondary route network. The tertiary network is the existing network at ground level, which is also used by conventionally steered vehicles.

Traffic flow simulation was used for the capacity analysis of this autonomous transport system. Different scenarios were simulated, which differed in terms of the desired speed and the vehicle type for each partial network examined. Compared to conventional vehicles, a approx. 70 % capacity increase at 80 km/h could be achieved. The capacity at junctions could be increased as much as 40 % (2000 vehicles/h). A transport model was developed specifically for the overall network analysis. It was based on an excerpt from the open street map graphs of the Singapore road network. Here it was confirmed that the mean speed, the mean traffic intensity, and the total travel distance increase by as much as 55 % with automated vehicles versus conventional vehicles. Mean traffic density and total travel time decrease by more than 10 %.

*"Intelligent, environmentally friendly, and integrated transport is one of the fundamental social challenges of our time. New technologies and methods are being used in order to get the most out of the macrosocial potentials of autonomous driving."*

DI Andreas Kerschbaumer,
Kompetenzzentrum - Das virtuelle Fahrzeug, Forschungsgesellschaft mbH

## Characterization




## Impact

The system proposed in the AVESTRA approach combines the advantages of the individual accessibility of motorized private transport with the higher capacity of public transport.

## Implementation

The specific form of infrastructure examined in AVESTRA is only suitable for Austrian cities under certain conditions at the present time. However, an effort will be made to pursue the topic further because of the export-oriented Austrian automobile and electronics industries, in which there are numerous businesses in the intelligent transport systems area. The local internationally active construction companies are also possible cooperation partners for implementing projects in newly constructed cities.

**Contact:**
DI Andreas Kerschbaumer,
Kompetenzzentrum - Das virtuelle Fahrzeug, Forschungsgesellschaft mbH

**Partners:**
TU Graz - Institut für Straßen- und Verkehrswesen,
Univ. Prof. Dr. Martin Fellendorf

**Project runtime:** 03/2014 – 05/2015

**Research associates:**

NEW MOBILITY SUPPLY AND SERVICES

CARGORIDER

# Alternative long distance passenger travel on oceans and rivers – sustainable travel concept for web-based agency operations

**In the exploratory project, it was looked into whether a platform comparable to the InterRail for railroads could be developed for ships. Such a platform would offer an alternative to air transport, especially for young people.**

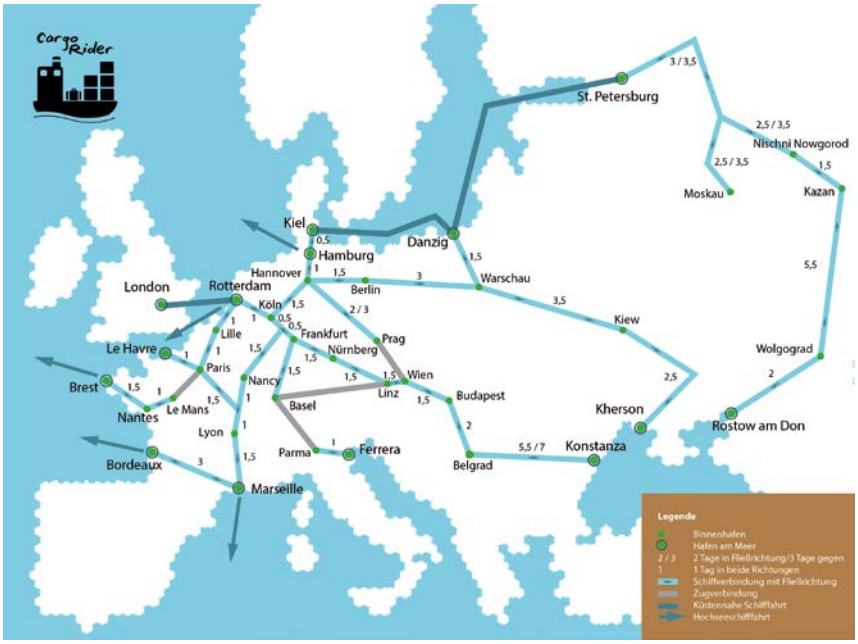


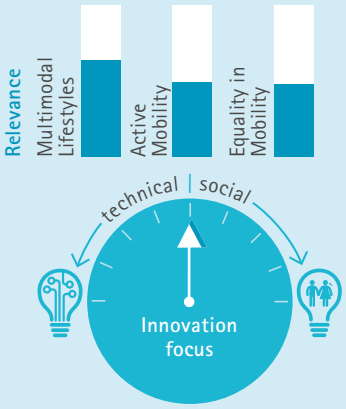

Figure: Depiction of possible travel routes (© FH St. Pölten)

The concept is based on the sustainability paradigm, since in contrast to air travel and cruises, the routes will be traveled anyway, independently of a business activity related to the travel sector. The project was an exploratory project, in which the feasibility of this idea was investigated. In the scope of a context analysis, the willingness of shipping companies and of ship owners to cooperate on such a platform was investigated. Addditionally, a fundamental concept was designed for the web platform with target group-appropriate interaction and visualization, and then tested for feasibility.

*"The exploratory work showed that such a service is possible and that there would be a willingness to try traveling by freighter. We were very pleased with the tremendous resonance during the project and the many amazing demands and discussions that followed. This exploratory work alone assured that this relatively unknown form of travel became more visible."*

Prof.(FH) Dipl.-Ing.(FH) Dipl.-Ing. Frank Michelberger, EURAIL-ING, Fachhochschule St. Pölten ForschungsGmbH

## Characterization




## Impact

The platform can lead to spontaneous and sustainable travel bookings and therefore higher earnings for freighter companies and freighter agencies. Moreover, the platform can be used as a marketing instrument for raising the awareness level and for presenting the positive image of the sector in a very positive light.

## Implementation

Although the service will remain a niche product, according to the business model it definitely has possibilities. However, the prerequisite for success is a strong cooperation with key stakeholders such as shipping companies or agencies.
A next step would be to strive for the further development of the service, including extensive test operation.

**Contact:**
Prof.(FH) Dipl.-Ing.(FH) Dipl.-Ing. Frank Michelberger, EURAIL-ING, Fachhochschule St. Pölten ForschungsGmbH

**Project runtime:** 05/2015 – 04/2016

**Research associates:**

NEW MOBILITY SUPPLY AND SERVICES

ELISA

# Providing e-cars via intelligent sharing concepts

**The contents of this project related to the exploration of potential target groups and service models for a bottom-up organized, peer-to-peer car sharing model. Providers would have the option of autonomously releasing usage times for the public and thereby generate refinancing contributions.**

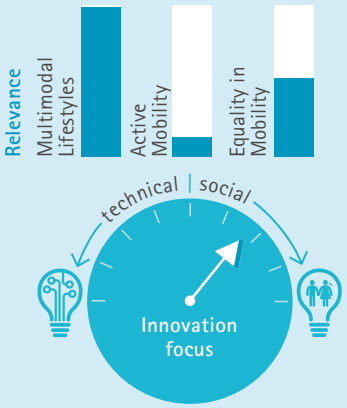
Figure: Sulzberg (Bregenzerwald) is starting in car sharing based on the ELISA model with 3 e-cars (Photo: Municipality of Sulzberg)

The submitted project ELISA focuses on an innovative mobility alternative for rural areas that is based on climate- and resource-friendly battery-powered electric vehicles (e-cars). The goal of the project is to explore potential target groups and develop a viable service model for bottom-up organized, innovative peer-to-peer car sharing. The providers of this service will autonomously release usage time windows for the public and can thus generate refinancing contributions – what we're talking about is the "eCashCar" model. In terms of methodology, first we will work with representatives of potential target groups according to the design thinking method, using co-creation elements. Then we will conduct focus group interviews with stated preferences elements and specialist workshops for evaluation.

*"Intelligent sharing concepts can help e-mobility make a breakthrough. The challenges of social innovations are enormous."*

DI Martin Reis, Energieinstitut Vorarlberg

## Characterization




## Impact

Accessibility in rural areas will be improved in a radical and sustainable imanner for people without cars. The basis for an economically viable service was developed with ELISA.

## Implementation

The outcomes of the project subsequently led to the formation of the CARUSO Car Sharing Cooperative, which develops, implements, and operates local car sharing services with communities.

**Contact:**
DI. Martin Reis,
Energieinstitut Vorarlberg

**Partners:**
Christian Steger-Vonmetz,
Innovationszentrum für Mobilität und gesellschaftlichen Wandel (InnoZ),
Vorarlberger Kraftwerke AG,
DB Mobility Services Austria,
c/o DB Vertrieb

**Project runtime:** 03/2014 – 02/2015

**Research associates:**

NEW MOBILITY SUPPLY AND SERVICES

FLEXICOACH

# Use-optimized rail vehicles

**The goal of the exploratory project was that of defining requirements for passenger train car interiors, the implementation of which will enable optimum satisfaction of passenger needs and optimum use of travel time, and which thanks to standardized productions solutions will be very economical.**

The key advantage of the railroad lies in the usability of the travel time. Potentially longer travel times compared to other forms of transport can thus be offset by reducing the amount of time wasted. However, this advantage cannot be exploited unless rail vehicles are optimally designed to meet the needs of passengers.

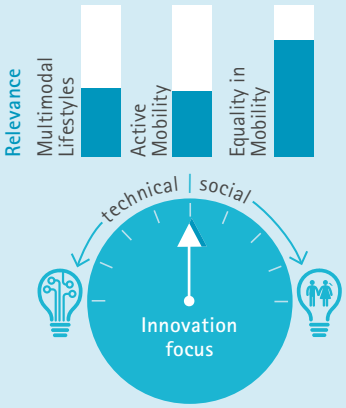
Passenger needs surveys and a benchmark for comparison to existing systems from the automobile, airplane, and rail vehicle industries and in supplemental fields were used as a basis for defining requirements which, if fulfilled, would satisfy the various needs efficiently, effectively, and in the best possible way. The project output consists of specific recommendations for other R&D activities, with the aim of designing efficient passenger car interiors in the near future.

There is a particular need for R&D in terms of customizability of the interior climate, effective vibration protection in the vehicles, protection from noise immissions and emissions in the vehicles, odor neutralization and customizable lighting concepts. Current technological options are still inadequate for satisfying these needs overall.

*"In the development of rail vehicles, FLEXICOACH highlights the importance of focusing on the behavior and needs of the travelers so that efficient concepts can be developed, thereby permitting a truly productive use of travel time and reinforcing the substantial advantages of the railroad over other transport modes. Currently approx. 30 % of travelers say that they cannot use travel time as they wish, but would like to use it differently."*

DI Dr. Bernhard Rüger, netwiss

## Characterization




## Impact

Travelers have very diverse needs in terms of an efficient use of time during a train trip, which must be satisfied in the best possible way. Accordingly, the exploratory project defines clear requirements that best meet the needs of passengers and permit train travel time to be designed in such a way that it is productive.

## Implementation

Railroad operators have already been able to implement suggested measures in part, such as installation of onboard servers so that terminal devices can be used more effectively. Appropriate R&D projects are being planned for pursuing the recommended and still infeasible measures.

**Contact:**
DI Dr. Bernhard Rüger, netwiss

**Partners:**
Technische Universität Wien - Institut für Verkehrswissenschaften, Forschungsbereich für Eisenbahnwesen, Verkehrswirtschaft und Seilbahnen,
ÖBB Personenverkehr Aktiengesellschaft,
Siemens AG Österreich,
FH JOANNEUM GmbH,
Fachhochschule St.Pölten ForschungsGmbH

**Project runtime:** 06/2012 – 05/2013

**Research associates:**

NEW MOBILITY SUPPLY AND SERVICES

GEPÄCKLOS

# Luggage logistics system for fostering sustainable, active, and equality in mobility

**The goal of the exploratory project was that of minimizing the development risks to future luggage logistics projects by clearly defining as many of the anticipated demands regarding a suitable luggage logistics system at the outset and by evaluating different concepts in terms of acceptance, economic efficiency, and feasibility.**

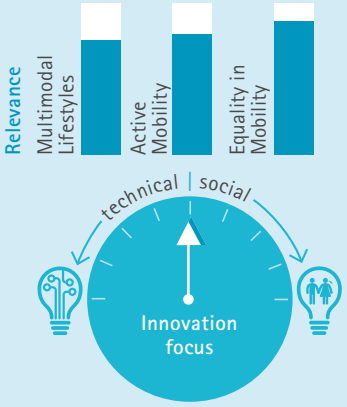
Whether on trips or in everyday mobility, hauling luggage is a key decision criterion for choosing one's car over sustainable and active mobility forms in up to 80 % of the cases. Freeing people from cumbersome luggage and thus fulfilling an essential prerequisite for choosing the desired mobility forms requires the development of a goods mobility that functions in parallel with personal mobility. However, systems that are suitable from a customer standpoint are still very complex, costly and difficult to implement. The job of the exploratory project was to design measures for the various mobility scenarios and mobility chains that would best fit customer needs, be accepted by customers, and thus have market potential.

The biggest challenges lie in the flexibility of checking and claiming luggage (with the systems currently in use, for example, a presence is always required) and in prompt transport. Up to 50 % of those surveyed expressed interest in a luggage system that would allow the use of non-car-based forms of mobility, but said that these systems had to be as flexible as possible. In terms of economic efficiency, the project shows that luggage transport absolutely must be coupled with the other aspects of small goods logistics. The exploratory project gave rise to the smartBOX project, in which a special box system permits flexible checking and claiming of luggage items.

*"In every respect, an adequate substitute for the trunk in private cars must found in order to make sustainable and active mobility forms appealing. GepäckLoS is making a preparatory contribution towards enabling the development of efficient systems for hauling travel and everyday luggage. By releiving people of the chore of having to haul their luggage themselves, such systems may motivate people to use active and sustainable mobility forms. For example, the studies show that the percentage of train travelers can be increased by as much as 20 % by establishing fully customer-oriented luggage logistics services."*

DI Dr. Bernhard Rüger, netwiss

## Characterization




## Impact

An increase of sustainable forms of mobility can be expected if customer-oriented luggage logistics systems are put in place for both traveling and everyday mobility. For example, the calculations show that the percentage of train travelers can be increased by as much as 20% by setting up luggage transport systems that fulfill all customer wishes.

## Implementation

The recommended R&D measures mainly relate to making the consignment and transfer of shipments as well as the consignment of shipments in the public sector more flexible, and also to efficient bundling, particularly in the area of local distribution.

**Contact:**
DI Dr. Bernhard Rüger, netwiss

**Partners:**
FH OÖ Forschungs&Entwicklungs GmbH, ÖBB-Holding AG, Technische Universität Wien - Institut für Verkehrswissenschaften, Forschungsbereich für Eisenbahnwesen, Verkehrswirtschaft und Seilbahnen, Fachhochschule ForschungsGmbH, Österreichische Post AG, promotion&co

**Project runtime:** 03/2014 – 02/2015

**Research associates:**

NEW MOBILITY SUPPLY AND SERVICES

ÖPNV-AUF-AB

# New avenues in local public transport on spur tracks in metropolitan areas

**In local public transport in metropolitan areas, the project revealed new avenues in the systemic connection with existing infrastructures and conventional transport solutions. The aspects of infrastructure as well as innovative vehicle technology, demand, official requirements, organization, operation, and profitability were prioritized.**

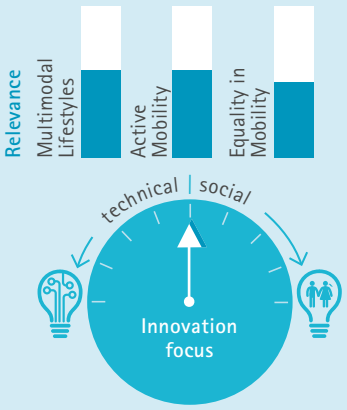
The potentials of spur tracks for local public transport in metropolitan centers were evaluated in this project. The results were then validated on a theoretical basis by using a case example. The challenge of "ÖPNV-AUF-AB" lay in the segmentation of the Austrian market. Regions were identified in which there are existing spur tracks and in which, owing to the population densisty and the existing local public transport service, there is a potential demand for passenger transport. On the basis of the aforementioned criteria, especially suitable spur tracks were then selected within the regions for further consideration. On the basis of the segmentation, five spur tracks serving approx. 55 companies around Linz, Salzburg, Innsbruck and Vienna/Lower Austria were examined in greater depth.

In addition to the segmentation, comprehensive check lists of key legal, technical and economic requirements in terms of the infrastructure, vehicles, and operation needed for implementing passenger transport services on spur tracks were prepared. The potential use of alternative/innovative vehicle technologies in conjunction with corresponding operating concepts in particular offers possibilities for cost optimization.

*"Because of the need for investment, the implementation of an initiative such as the one studied and developed in the 'ÖPNV-AUF-AB' exploratory project is hard to justify over the short term for individual, local projects. When considered over the long term, however, it contributes substantially to the optimization of public service costs. For this reason, we feel that the inclusion of and cooperation with political decision makers in terms of public services and economic benefits, climate-friendly mobility, maintaining spur tracks for commercial use, and an additional use for the local public transport system by the residential and working population in the commuter area in view of the demonstrated use potential, are substantial decision criteria for a potential implementation of the ÖPNV-AUF-AB initiative. The main feasibility study showed that pursuing this innovative railbound regional transport service in greater depth is both sensible and expedient."*

Mag.(FH) Konrad Röthel, MA

## Characterization




## Impact

The project contributed to raising awareness among these target groups regarding potential and more efficient uses of existing spur track infrastructure. These possibilities can be evaluated in corresponding implementation projects.

## Implementation

The ÖPNV-AUF-AB project was carried out as an exploratory project (exploratory study), in which potential target groups have already been addressed. Depending upon investments by potential implementation partners, the next step will be the pilot testing of local passenger transport concepts on spur tracks in metropolitan areas.

**Contact:**
Mag.(FH) Konrad Röthel, MA
TECHNOMA Technology Consulting & Marketing GmbH

**Partners:**
TECHNOMA Technology Consulting & Marketing GmbH,
MC Mobility Consultants

**Project runtime:** 03/2015 – 02/2016

**Research associates:**

NEW MOBILITY SUPPLY AND SERVICES

PHANTASIJA

# AKTIV MOBIL: I make my world wide wide the way I like it

**The PhantasiJA project was based on the idea of young people coming up with ideas for a city of the future in which active mobility is the main way of getting around. Some of the measures that they proposed were then evaluated by specialists and incorporated in a RTD concept.**

When working with youth, the fact that young people are less set in their ways of thinking than adults and are open to (thought) experiments should be exploited. This openness was a key preequisite for employing a creative and fun working method to come up with proposals that offer strategies to counteract lack of physical activity, traffic problems, and environmental problems by making active mobility more appealing.

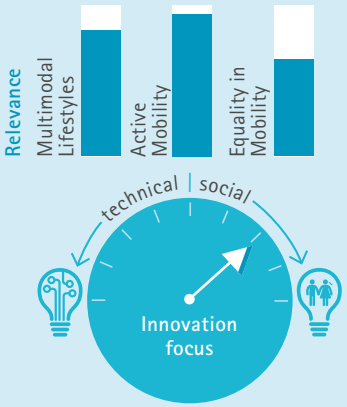
Focus group discussions were conducted with three scout troops (two in Vienna, one in Linz). The topic of these discussions was everyday mobility of youth and wishes and barriers regarding the same. Workshops were then held at a later date with the two Viennese troops, in which the object was to develop as many ideas as possible in an initial brainstorming phase using visual synectics, brainwriting, and speed dating methods. Together, these ideas were organized on a large mind map and were then incorporated in role playing games and in the designing of a mobility campaign.

In an evaluation workship on a later date, mobility specialists chose some of the collected ideas and evaluated them in terms of feasibility, sustainability, and innovative content. The feedback from this evaluation played a substantial role in the development of an RTD concept, in which the concrete ideas were assimilated in abstracted form in order to reveal trends and lines of thought.
When the results were summarized, it became clear that the linkage of fun or rather diversion and mobility is very important to young people. They would be motivated to engage in active forms of mobility more often by attractively designed routes. Also evident is the importance of smartphone apps, which are not only used for organization and orientation, but can also motivate young people to exercise through fun incentives (gamification). Something that is typically associated with futuristic cities – flying cars – was also transferred to other transport modes. Glass bridges that convey the sensation of hovering likewise testify to the yearning of many young people for attractive, intersectionfree routes on a second level, which permit steady and rapid progress.

*"Young people want to have a choice among several transport mode alternatives. Last but not least, what they end up choosing at a given time depends on the fun factor."*

Lukas Hartwig, scientific collaborator at FACTUM Chaloupka & Risser OG

## Characterization




## Impact

The project helped gather data on the experiences and wishes of the users of different transport modes, who do not limit themselves to the status quo. The fun and fanciful nature of the project made it possible to deduce requirements for making transport modes attractive that go beyond technical issues and that can help in designing and advertising a future service.

## Implementation

A follow-up project is planned in order to test some of the young people's ideas in actual practice.

**Contact:**
Lukas Hartwig,
FACTUM Chaloupka & Risser OG

**Partners:**
FACTUM Chaloupka & Risser OG,
komobile w7

**Project runtime:** 06/2015 – 05/2016

**Research associates:**

NEW MOBILITY SUPPLY AND SERVICES

SYNAREA

# Synergetic territorial coverage with public transport and low-threshold shortdistance private transport

**A new model of rural and suburban region traffic coverage was designed in the SynArea project. It is based on a rental system of novel lightweight e-cars with reduced roadworthiness requirements, a comprehensive on-demand transport service, and a methodical public transport optimized for a backbone function.**

Figure: Connectable lightweight e-cars

In contrast to metropolitan areas, in which there is a discernible trend reversal in mobility behavior (shifts from motorized private transport to ecomobility, retrograde degrees of motorization), peripheral and suburban regions are still the hard nuts to crack of sustainabilityoriented transport planning: neither conventional line-bound public transport nor novel intermodal services have yet been able to achieve a far-ranging impact here. However, the regions in question are too relevant in terms of population percentages and transport emissions to accept the prevailing dominance of motorized private transport and concentrate just on regions with an affinity for public transport.

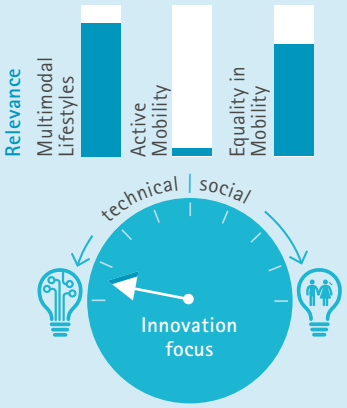
Hence with the aid of example regions, a comprehensive mobility concept was developed in this project, which makes optimum use of the strengths of the individual components of the transport system (rental system, on-demand transport, line transport). For rental systems and on-demand transport, lightweight e-cars were custom-designed to fit the requirements of peripheral and suburban regions: these ecars are connectable (making redistribution easier) and have a maximum speed that can be adapted according to the type of license (mobility services for population groups that do not have access to a personal vehicle; supplement to line transport). The main finding from the project is that if the concept were applied, a shift away from motorized private transport of up to 7% as well as a significant improvement of access would be possible without a personal vehicle, without placing additional burdens on public budgets.

The project was awarded the VCÖ Mobilitätspreis 2015 in the research projects category.

*"The implementation of SynArea In the two example regions would reduce the percentage of trips for which there is a de facto reliance on cars from approx. 50-65 % to a mere 2-7 %."*

Dr. Harald Buschbacher, ÖBB Personenverkehr AG

## Characterization




## Impact

If the project leads by way of several follow-up projects to a market introduction, as the team hopes, this would mean substantially less emissions and energy consumption as well as an improvement in both equal opportunity and social participation. But aside from this implementation path, the published project results will also serve as an inspiration and database for the researching and implementing community in the mobility sector.

## Implementation

An implementation in the first pilot regions would be conceivable by approx. 2020.

**Contact:**
Dr. Harald Buschbacher,
ÖBB Personenverkehr AG

**Partners:**
ÖBB-Personenverkehr AG,
AMSD Advanced Mechatronic System Development KG,
Spirit Design - Innovation and Brand GmbH,
Technische Universität Graz,
komobile w7 GmbH

**Project runtime:** 04/2014 – 03/2015

**Research associates:**

NEW MOBILITY SUPPLY AND SERVICES

WOMO – WOHNEN & MOBILITÄT

# Living & Mobility – Integration of location-based mobility in the planning process

**The goal of the project was to integrate multimodal mobility in the process of planning residential properties and districts and to develop specific products for this purpose, while taking individual mobility needs of residents into account.**

One's place of residence has considerable influence on one's personal mobility behavior. However, the topics of living and mobility are often considered separately in residential and housing development construction, and new multimodal mobility services are not given sufficient consideration in the planning process. The project therefore involved depicting the relevant interfaces between the two areas of living and mobility and working out specific implementation possibilities.

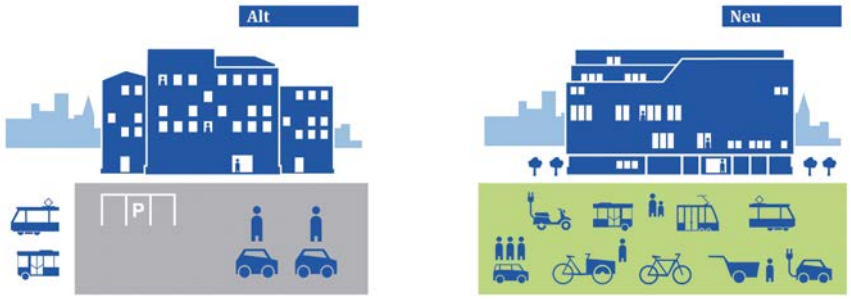
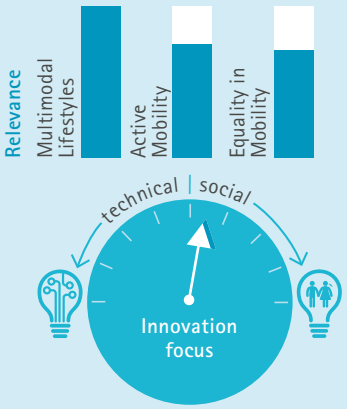



Figure: Illustration of coventional planning paradigms for residence & mobility options (old) and new, integrated planning approaches


Figure: Illustration of a mobility kiosk as a component of an integrated mobility solution in residential housing

## Characterization




## Impact

One of the product ideas developed in the scope of the project was the construction and operation of a mobility point, where residents can rent low-emission vehicles such as e-cars, e-bikes, or e-cargo bikes. The project indicates that if living and mobility are considered as being integrated, then in the building plan (a) fewer parking places are needed than provided for in the legislation, (b) car ownership is not a necessity if sharing services are available in the immediate vicinity, and (c) environmentally friendly vehicles that produce fewer emissions are promoted.

The outcome of the project is a new model for designing residence site-specific, urban mobility systems. Specifically, three residence site-related mobility products were developed and enhanced. These products can be scaled in terms of dimensioning and equipment and thus adapted to the respective local regional needs. In the scope of focus groups and a specialist workshop, the product ideas were examined in terms of their validity and feasibility.


Figure: WOMO planning workshop with mobility and residential construction specialists

*"Our goal was to approach the topic of living & mobility from a usability perspective and to develop a concrete product. As a consequence of the WOMO project, we founded MO.Point GmbH and by 2016 we were able to put our first mobility point with eight sharing vehicles in operation."*

DI Gregor Wiltschko, raum & kommunikation GmbH

## Implementation

An outcome of the exploratory project was the founding of MO.Point GmbH by the project team. This company offers the services of planning, construction, and operation of mobility points in housing complexes and city districts. The first mobility point opened in June 2016, just one and a half years after the end of the "WOMO" project, in a housing complex in the Liesing district of Vienna. It has two e-cars, an e-cargo bike, and five e-bikes available for residents to rent.

**Contact:**
DI Gregor Wiltschko,
raum & kommunikation GmbH

**Partner:**
Spirit Design - Innovation and Brand GmbH

**Project runtime:** 01/2014 – 12/2014

**Research associates:**

PLANNING / MODELING / SIMULATION

MOBILITY TRENDS

# Making use of correlations between searching behavior in internet search engines and mobility-relevant issues

**The substantive goal of the Mobility Trends project was to explore wether it is possible to use existing data and information on the searching behavior of internet users to deduce correlations between the searching behavior of persons in internet search engines and issues relevant to transport and mobility, and then to make use of these correlations for the transport and mobility community.**

In the Mobility Trends project, the term big data was defined as a survey method with which it is possible to process data volumes that are too big, too complex, change too fast, and/or are too weakly structured to be processed with standard data processing procedures. In this project, search requests made by individuals in internet search engines (Google, Yahoo, and Bing) were examined in terms of their suitability for addressing transport-related issues.

On the basis of a literature analysis, the following three use cases were defined and subsequently examined in terms of their potential for the transport and mobility community:

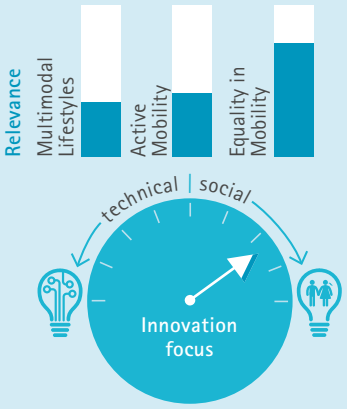
1. Correlation between the open data of *Wr. Linien* and the internet search requests pertaining to public transport in Vienna
2. Correlation between evaluations of public transport in Vienna and actual use
3. Correlation between internet search requests pertaining to transport services and the price trend

The most significant substantive project result is that the integration of big data (in particular search engine requests) in transport and mobility research projects leads to significantly reduced costs compared to standard survey methods, particularly if the assumed correlation hypotheses can be confirmed.

*„International studies show that 69 % of all companies that have already had experiences with using big data are able to make better strategic decisions, and 54 % are also able to make better operative decisions. On an international level, big data are already being used in isolated cases in the transport and mobility area. The working group would like to see this topic introduced in acautious yet vehement manner in Austria as well."*

Mag. Alex Schubert, project coordinator, netwiss

## Characterization




## Impact

Because Mobility Trends is an exploratory project, the impacts are purely academic: it could be shown that the use of big data in the transport and mobility area can lead to significantly reduced costs in the collection of empirical data. It is thus expected that big data will be used to a greater extent in the coming years in dealing with transport topics.

## Implementation

The working group will pursue the big data approach in future projects at any rate. Because big data solutions have become established in diverse other sectors, the same is expected to occur in the transport and mobility area. However, the Austrian market is too small for this.

**Contact:**
Konsortialführer: Mag. Alex Schubert, netwiss

**Partner:**
pn-venture OG

**Project runtime:** 03/2015 – 02/2016

**Research associates:**

PLANNING / MODELING / SIMULATION

SHIQUE

# Sensor technology in cell phones for infrastructure quality and user experience

**The SHIQUE project explored the extent to which sensor technology in smartphones can be used in a crowdsourcing/open data environment in Austria for providing and using reliable, high-quality transport data at a reasonable cost and collected automatically.**

Figure: Differences in asphalt quality at the JOANNEUM Technical College Campus in Kapfenberg (dark blue = poor)

Over six million Austrians now own a bicycle. Special transport data are needed for expanding and maintaining bicycle paths. From a technical standpoint, however, collecting this tranport data is difficult and expensive, and thus it is rarely done. The SHIQUE project addressed this deficiency of transport-related data and is conducting research to find a solution: an effort was made to develop an app that collects high quality data in sufficient quality and as economically as possible. Crowdsourcing, i.e. the outsourcing of tasks to volunteers via the internet, is an option for this kind of data collection.

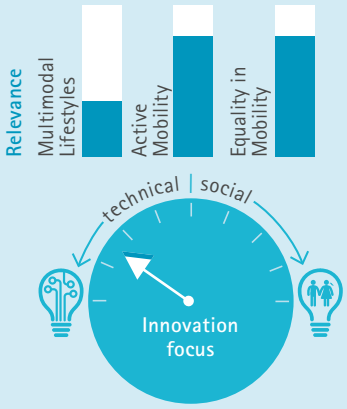
The data are collected by means of a smartphone app, which uses the sensor technology in smartphones to survey the infrastructure quality of bicycle paths. The idea is to give rise to a user experience; i.e. the users of the app can collect their data themselves. This technological leap should provide both the road administration and the respective persons in charge with a tool for better decision making regarding investments in active mobility. If infrastructure is redesigned on the basis of these data, then these new solution will also be evaluated.

As project results, mention can be made of a large volume of transport data and the analysis thereof. Parts of the results have already been implemented in the Bike Citizens app.

*"What I appreciate about the SHIQUE project is that it is possible to collect excellent quality transport data in a virtually incidental manner with smartphones, which have since become an indispensable part of everyday life. The data give rise to compelling statements that improve active mobility substantially."*

Melanie Rogetzer, SHIQUE project team member

## Characterization




## Impact

Active mobility and maintenance management can be improved considerably through the SHIQUE project. In general the data situation can be improved through the project, it serves as decision basis for making investments and for assessing the need of them.

## Implementation

The project results are being implemented in practice by an app from BikeCityGuide Apps GmbH.

**Contact:**
DI(FH) Markus Dornhofer, MSc
FH JOANNEUM Gesellschaft mbH
Institut für Energie-, Verkehrs- und Umweltmanagement

**Partner:**
BikeCityGuide Apps GmbH

**Project runtime:** 04/2015 – 08/2016

**Research associates:**

# Other exploratory projects still underway:

## INFORMATION / NAVIGATION

### (R)adOmnes
**Promotion of bicycle transport in everyday mobility for all travelers**

**Contact:** Univ.-Prof. Dr.-Ing. Martin Fellendorf
**Organization:** TU Graz - Institut für Straßen- und Verkehrswesen
**Partners:** BikeCityGuide Apps GmbH,
Universität Graz - Institut für Sportwissenschaft

## NEW MOBILITY SUPPLY AND SERVICES

### KOMPETENZ
**Improvement of everyday mobility for persons with cognitive disorders and dementia**

**Contact:** Mag. Daniel Bell
Organization: FACTUM Chaloupka & Risser OG
Partner: Research & Data Competence OG

### Shared Autonomy
**Potentials for the community use of autonomous vehicles in rural areas**

**Contact:** Mag. Tobias Haider
**Organization:** UbiGo
**Partners:** Universität für Bodenkultur Wien - Institut für Verkehrswesen,
Measury, Verein zur Förderung von Sozialunternehmen

### SENEX
**SENsor networks for the EXploration of dementia**

**Contact:** Dr. Wolfgang Narzt
**Organization:** Johannes Kepler Universität Linz - Institut für Wirtschaftsinformatik - Software Engineering
**Partners:** Universität Linz - Klinik für Neurologie I,
Kepler Universitätsklinikum,
sew systems gmbh

## PLANNING / MODELING / SIMULATION

### DeMo
**Mobility-related needs of dementia patients, caregivers, and family members**

**Contact:** DI Monika Wanjek
**Organization:** TU Wien - FB Verkehrssystemplanung | Department für Raumplanung
**Partners:** Landespflegeheim Wiener Neustadt,
MAKAM Research GmbH,
Dr. Christopher Schlembach

You can find more details on the exploratory projects in progress at www.ffg.at/verkehr.

# 5.
# Building know-how. Laying foundations.

**Mobility of the Future is using research and development activities to build the foundations for a knowledge-based transport and mobility system in Austria. Through fundamental mobility and transport research *(grundlagenorientierte Mobilitäts- und Verkehrsforschung, GLOMVF)*, gaps in knowledge of mobility-relevant issues can be closed, formerly vague concepts can be defined, put in concrete terms or rather operationalized, or new methodologies can be developed. The findings broaden the knowledge base in the thematic field and are incorporated in future research and development initiatives as well as in the further strategic orientation of the program. The research projects thus form the foundation for a responsible innovation and transport policy, with an effect-oriented implementation of innovative solutions for personal mobility.**

Kostrat-AktiL

# Coordinated RTI strategies for mobility and life quality in the context of demographic change

Demographic change – understood as meaning continuous and comprehensive change of the population in terms of its scope and make-up (e.g., age and gender, ethnicities and languages) – is a process which all modern societies undergo. As such, it presents a challenge for which the only possible solution seems to lie in fundamental technological, economic, political and social transformations. Enhacing the mobility and life quality of an aging society requires diverse measures, which involve many different stakeholders in state activity (research, technology, and innovation (RTI), urban and regional development, transport and transport infrastructure, health, social welfare, education).

Against this background, the fundamentals for the development of a cross-sector RTI strategy in the context of "mobility and life quality" were elaborated in the project. Fields of action and needs were determined by means of literature analyses, interviews, focus groups, and a foresight process with relevant stakeholders. An interministerial working group then integrated the results in a common, all-encompassing strategy document (the RTI-AG 3 "Life Quality and Demographic Change" Roadmap for Implementing the RTI Strategies of the Austrian Federal Government). In order to contribute to the fields of action, goals and initial measures were identified in the following priority topic areas:

- Public space design
- Diversity,
- Paradigm change
- Change processes
- and ICT, e-government and logistics.

Several RTI measures have since been included as research topics (e.g., mobility & health, mobility & dementia) in subsequent calls for bids of the Mobility of the Future program. Research projects on these topics have been started.

*"Major challenges such as climate change, demographic change, and the management of scarce resources cannot be solved by individuals. Allencompassing RTI strategies designed in coordination with key stakeholders provide solutions to concrete challenges. The project has laid the foundation for the substantive orientation and designing of cross-sector research and innovation activities. In order to achieve impacts, we must now focus on implementation potentials and getting public and private stakeholders involved."*

Mag. Michael Dinges, AIT Austrian Institute of Technology GmbH

**Contact:**
Mag. Michael Dinges,
AIT Austrian Institute of Technology GmbH

**Partner:**
FACTUM – Chloupka & Risser OG

**Project runtime:** 02/2014 – 03/2015

**Research associates:**

**Final report:**

**RTI-AG 3 "Life Quality and Demographic Change" Roadmap for Implementing the RTI Strategies of the Austrian Federal Government:**

Costs

# Affordable mobility: Determinants, effects, developments – elaboration and evaluation of innovative strategic options

The affordability of the important consumer good mobility is an essential prerequisite for social and economic participation by all population groups and consequently for prosperity as a whole. Assuring affordable mobility options is thus a key objective of Austrian transport policy. It is being addressed in the Mobility of the Future program, specifically in terms of innovative mobility solutions ("Equality in mobility" innovation field). However, there is a need for fundamental clarification and research, all the more so since there are no standard definitions for the term "affordable mobility", the determinants relevant to expected developments are unknown, and hence the consequences of public and private actions cannot be predicted.

The COSTS study therefore pursued:

- a workable definition of "affordability of mobility" and expansion of the state of knowlege regarding current and future developments in Austria;
- the development of strategic guidelines for policy and supply measures for assuring affordable mobility
- and proposals on and for the assessment of innovative solution approaches, which will contribute to the implementation of the guidelines with (when possible) cost-effective measures.

A series of social as well as economic scientific methods were used in the scope of the project. An extensive "desk research" served as a basis for elaborating the necessary knowledge bases, the pooling and combined statistical analysis of available microdata sets of the consumption, household income, and transport behavior thematic fields, and the illustrative use of a macroeconomic model for assessing consumer reactions due to energy price increases.

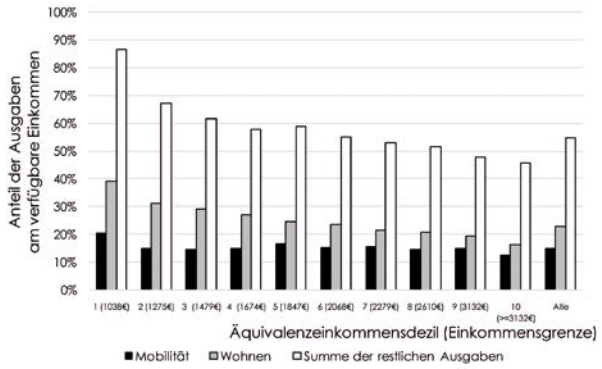



Figure: Income and mobility expenditures of Austrian households expressed as a percentage of disposable income16 (Consumer Survey 2009/10) Source: Statistik Austria, WIFO calculations.

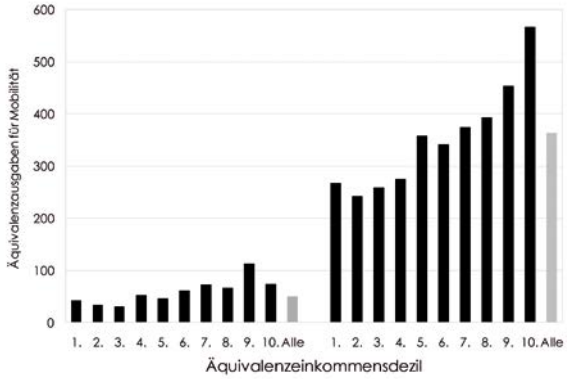



Figure: Equivalized expenditures of households for mobility according to car ownership and equivalized income deciles (Consumer Survey 2009/10, means, euros per month), Source: Statistik Austria, WIFO calculations.

The findings underwent critical reflection and were enriched with practical expert knowledge by a panel (steering group).

The clarification of the general definition proposed in COSTS focuses on calculating the percentages of disposable household income spent on mobility. It is in line with the requirement of being analytically feasible and able to use existing data sets such as consumer surveys.

Among other things, the study results show

- that the approx. 1 million low-income households spend an average of 172 euro per person per month of their income on mobility, which is disproportionally high, these households;
- that mobility expenditures and hence affordability are significantly determined by car ownership; low income households with car ownership are disproportionately affected by high (combined) expenditure burdens: 40 % of the households in this category spent more than 50 % of their income on housing and mobility;
- that reducing the dependence on cars (particularly in terms of ownership) is thus the fundamental prerequisite for a sustainable yet affordable transport system and that there is a need for further research and innovation in this area;
- that a continuous monitoring based on the fundamental findings would be a worthwhile approach for answering questions related to transport and/or to social policy such as "is there sufficient assurance of affordable mobility or is there a need for stepping up efforts in this regard?".

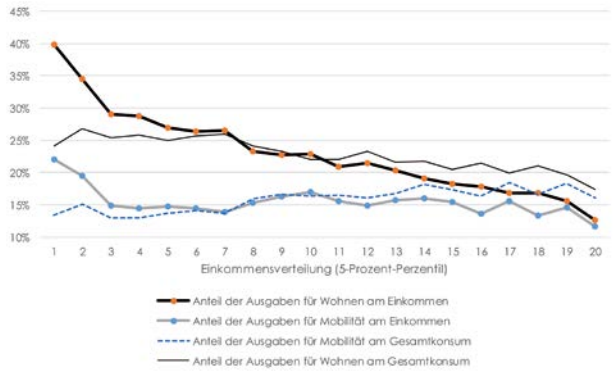



Figure: Average percentage of disposable income and overall consumption allocated to housing (without expenditures for second homes and home upkeep, incl. home insurance) and mobility (Consumer Survey 2009/10)
Source: Statistik Austria, WIFO calculations.

*"A sustainable yet affordable transport system is above all one that provides transport mode alternatives beyond car ownership and use that are suitable choices in everyday life, and yet is inexpensive in terms of both user and overhead costs. These options must be appealing and tailored to the region types, and must in principle be designed for ready spatiotemporal availability."*

Dr. Romain Molitor, komobile w7 GmbH

**Project management:**
Dr. Romain Molitor, komobile w7 GmbH

**Project partner:**
WIFO [Austrian Institute of Economic Research]

**Project runtime:** 03/2014 – 10/2015

**Research associates:**

**Final report:**

OPERMO

# Operationalization of multimodality in personal transport in Austria

The term "multimodality" has been in use in the professional world for a number of years and when it comes to innovative mobility solutions ("Multimodal Lifestyles" innovation field), it is of great importance to the mission-oriented RTI promotional program "Mobility of the Future". However, thus far there has not been a standard definition of "multimodality" in personal transport on either the national or international level. As a result, studies on multimodal transport behavior are generally not comparable, universally valid correlations are very difficult to find, and with different parameters innovations cannot be pursued in a target-oriented fashion.

In the scope of the OPERMO project, we came up with and formalized the first standard definition of multimodality in three dimensions ("service", "mindset", and "behavior") that was widely accepted by the professional world as well as practical. Then we developed a monitoring system for observing multimodal mobility behavior and tested it on actual mobility data (BRAWISIMO Mobility Data Survey Upper Austria and Vienna-Bratislava).

To this end, the fundamental operationalization system takes all three dimensions into account and enables multimodality to be described in different levels of detail according to indicators. The OPERMO monitoring system serves as an instrument for systematically investigating whether and how (during which observation time period, what distance, with which transport modes, etc.) people move about (multiomodally), what (multimodal) mobility services are available to them, and what the mindset of the people toward multimodal mobility behavior is. If this is done at periodic intervals, then developments and trends toward multimodal mobility behavior can be deduced from these results.

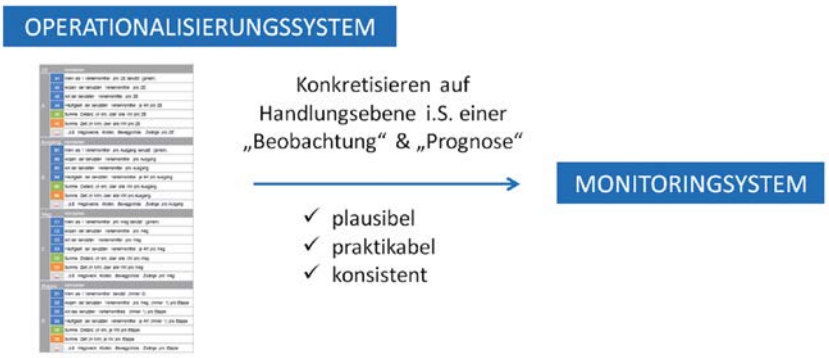



Figure: Overview of "from the operationalization system to the monitoring system"

*"In the scope of the OPERMO project, we succeeded in coming up with and formalizing the first standard definition of 'multimodality' in personal transport, and in developing a monitoring system for multimodality. This takes place in a participative approach on the national and international level, with the aim of enabling optimum integration of the knowledge from the transport community on the one hand, and enabling broad acceptance of the results on the other hand. The feedback from the transport community was very positive in terms of both the methodical approach for generating the results and the results themselves."*

DI Dr. Alexander Neumann, netwiss

**Contact:**
DI Dr. Alexander Neumann, MA MSc,
netwiss OG

**Project partners:**
Technische Universität Wien,
Fachbereich Verkehrssystemplanung,
komobile w7 GmbH,
FACTUM – Chloupka & Risser OG

**Project runtime:** 03/2014 – 02/2016

**Research associates:**

**Final report:**

Definition of "multimodality" – from a service standpoint

A mobility service can be called multimodal if at least two reasonable transport mode alternatives are available, within a specific (observation) time period, to the travelers for fulfilling their specific transport needs.

**Definition of "multimodality" – from a behavior standpoint**

An individual's mobility behavior can be called multimodal if different transport modes are used within a specific (observation) time period.

**Definition of "multimodality" – mindset**

An individual's mindset can be called multimodal if this person is open to the use of different transport modes and is willing to choose the subjectively best transport mode for each route.

QUERDENKEN QUER DENKEN

# Companion study for further developing the "Personenmobilität quer denken" [Personal mobility: thinking outside the box] pilot initiative

The challenges of the future demand radically new solution approaches and project ideas in the personal mobility thematic field. Because they must tread "new territory" regarding content, it is not uncommon for such project proposals to fall behind compared to more contemporary approaches in the selection of projects for funding. While an orientation toward realization chances and implementation possibilities increases the practical relevance of research, it also makes it difficult for a highly innovative project substrate to come into being.

To assure that "unconventional project ideas" outside traditional paths and established thought patterns are also promoted, an environment for those who think outside the box was created for the first time in the 4th "Mobility of the Future" call for bids, namely with the "Personenmobilität quer denken – crazy ideas for serious problems?" pilot initiative. The goal is to create an explorative area along the lines of the RTI Roadmap for "unconventional thinkers" in the thematic field as well, in order to generate the broadest possible spectrum of new ideas.

In the scope of the "Querdenken quer denken" [thinking outside the box] companion study, initial experiences with the pilot initiative were analyzed and the "barriers" to unconventional ideas were studied in more detail. As a result, measures and suggestions for ways to integrate innovation promotion and "unconventional thinking" in an ideal-typical fashion in instruments, calls for bids, and decision-making processes were deduced, and it was determined which accompanying interventions are necessary and appropriate. Throughout the entire process of the companion study, various information and communication rounds were held with sponsors, grant recipients, and the research community, and experts from "unrelated" disciplines were also included in order to gain new perspectives from outside the mobility area. National and international research sponsorship programs were studied, and projects were analyzed on the basis of different dimensions (funding, risk, innovative content, sustainability, interdisciplinarity, etc.).

The findings confirm the clear need for further and supplementary measures to support "unconventional project ideas", but they also reveal current limits in funding practice and in the funding instrument portfolio. Thematic openness (also beyond the personal mobility thematic field) and low-threshold access to funding (also for stakeholders outside the standard target groups), the development of new access channels and ways of support, modified processes for project selection, continuity and long-term initiatives, and further support beyond research promotion are just some of the key cornerstones.

*"The expectations with respect to promoting groundbreaking innovations are high, but 'satisfying' them or 'recognizing the potential' requires a 'safe space' outside of previous funding practice: a niche for establishing unconventional ideas, for addressing new players through new incentives, and for combining ideas and technological innovations with social aspects."*

Ao. Univ.-Prof. Mag. Dr. Günter Emberger

**Contact:**
Ao. Univ.-Prof. Mag. Dr. Günter Emberger, TU Wien - Institut für Verkehrswissenschaften

**Project partner:**
Research & Data Competence OG

**Project runtime:** 03/2015 – 02/2016

**Research associates:**

**Final report:**

| | |
|---|---|
| Users | • Jurors, uninvolve persons<br>• From the social sector |
| Researchers | • From other disciplines<br>• International<br>• Free thinkers with vision |
| Implementers | • Sponsors, industry<br>• State sector Infrastructure operators |

Figure: Suggestions for broadening the panel membership for the selection of projects with unconventional ideas, Source Project: "Querdenken quer denken" 2016 [Thinking outside the box].

RELAUT

# Unreliable travel times in Austria: Quantity, costs, and impact

The economic costs of unreliable travel times are substantial:
Travelers reach their destinations earlier or later than expected, or must allow for long buffer times in order not to arrive too late. Businesses and consumers incur costs if intermediate products and goods are delivered too late because of unreliable travel times. Neither the extent and costs of unreliable travel times, nor the impact thereof on the behavior of travelers, have ever been investigated in Austria before. RELAUT is closing these knowledge gaps by analyszing Austrian road traffic data, measuring punctuality in public transport, and with a user survey.

RELAUT shows how both the P-side (P=price) and the Q-side (Q=quantity) of (travel time) unreliability in Austria can be measured. To this end, a representative survey on the perception of and reaction to unreliability was conducted with 316 participants. The main causes of unreliability in terms of subjective perception are generally the traffic volume (i.e. exceeding the capacity limits of the transport infrastructure or of the transport modes), followed by isolated events such as weather conditions, construction, and accidents. For most trips, punctuality was rated as important (with significant differences in terms of the purposes of the trips). Typical reactions to (expected) unreliability are changing the departure time, the transport mode, or the route.

The average buffer time that must be planned in to allow for unreliability is 22.5% of the ideal travel time. In order to be able to end 90% of the trips at the planned time, one would have to plan a buffer time of 50% of the ideal travel time (based on the actual travel time). One needs to plan for longer buffer times with public transport than with motorized private transport for nearly all reliability specifications, in order to arrive at one's destination on time. The calculated willingness to pay for the reduction of unreliability is 7.10 EUR (based on a one hour reduction of the standard deviation of the spread of the travel times). The willingness to pay for the reduction of travel time is 13.57 EUR/hour. Both values are in line with the results that were obtained in similar studies, including ones in other countries.

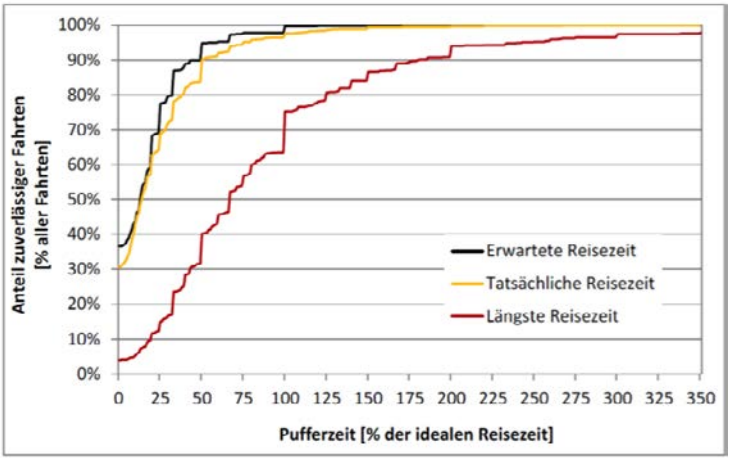



Figure: Percentage of reliable trips as a function of planned-in buffer time

Road traffic data from ITS Vienna as well as public transport data from Linz Linien were used to measure unreliability (Q-side). The reliability was calculated for selected road sections and public transport lines. Possible explanatory factors for (un)reliability were calculated using regression analysis. Examples of such factors include the time of day, weekdays, vacation times, weather conditions, and (in the public transport context) the length of a bus line. A strong (positive) correlation between average delays (or the average schedule deviation in public transport) and unreliability was confirmed. This relationship can be used to predict unreliability if only the average delays are known. It was also clearly shown that information on factors that impact travel times (e.g., weather conditions, weekdays, the general traffic situation at a given point in time, and vacation times) leads to a significant reduction of perceived unreliability.

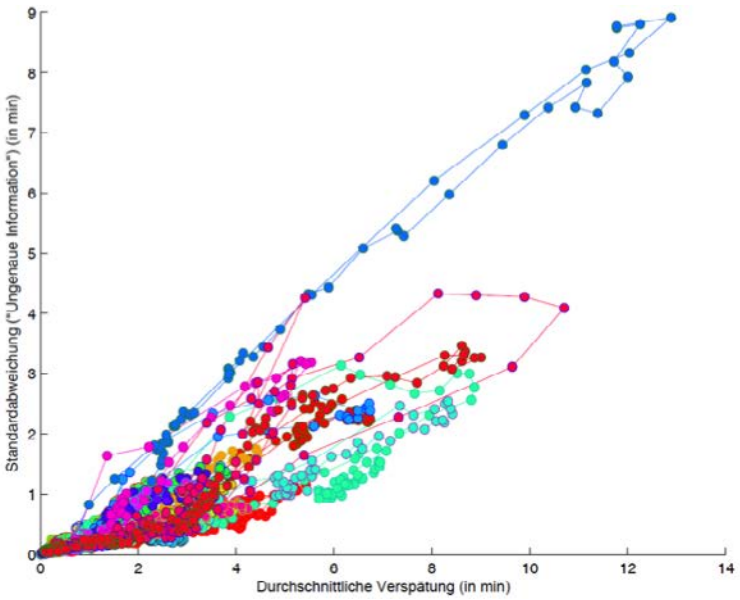



Figure: Correlation between average delay and standard deviation based on the data analysis by ITS-Vienna (each color corresponds to a road section)

A detailed literature review, the results of the surveys and of the travel time analyses, and two specialist workshops were used as a basis for coming up with recommendations for measures to improve reliability as well as regarding information channels, monitoring systems, databases, and future research questions. To this end, specific definitions of travel time (un)reliability in personal mobility were proposed and operationalized. The study answered a comprehensive list of questions on transport and RTI policy aspects in the topic field and provided specific recommendations for action.

*"The topic of (un)reliability of travel times first came to the attention of transport scientists a few years ago. RELAUT considered this problematic subject from an Austria-specific standpoint for the first time. The (un)reliability of travel times will also be an important topic in the future, namely in connection with the trend toward multimodality and the most recent technological advances (self-driving cars, networking, etc.)."*

Stefanie Peer PhD, Wirtschaftsuniversität Wien, Department Sozioökonomie

**Contact:**
Stefanie Peer PhD, Wirtschaftsuniversität Wien, Department Sozioökonomie

**Project partners:**
Universität für Bodenkultur, Institut für Verkehrswesen,
Österreichisches Institut für Raumplanung,
Significance NL,
Vrije Universiteit Amsterdam,
Department of Spatial Economics

**Project runtime:** 03/2015 – 04/2016

**Research associates:**

**Final report:**

ShareWay

# Ways of further developing shared mobility to the third generation

The sharing economy now encompasses vast portions of the economy and society. Driven by information and communication technologies, digitalization, and also cultral change processes, new consumer practices and business models in which the focus is on access to rather than ownership of goods have come into being. Examples of changed consumer and business practices include innovative car sharing services, internet platforms for arranging private overnight stay options or for brokering rarely used goods such as campers, platforms for loaning and exchanging used objects on the internet, and so forth.

A broadening and differentiation of the sharing concept can also be observed in the mobility area. The resulting spectrum of shared mobility services ranges from bicycle rental systems and fully flexible car sharing, and novel ride sharing services to organized parking place sharing. However, there are still fundamental question that remain to be answered. What framework conditions influence the development of shared mobility? Which developments are drivers, which ones are obstacles? What are the actual benefits of shared mobility services in terms of their environmental impacts, social inclusion, the economic efficiency of the entire transport system, and the sustainable change of mobility patterns? What synergies arise with other transport areas such as the transport system or technological innovations such as autonomous driving?

On the basis of a definition (use without ownership of the mobility services of different transport operators, excluding public transport and taxi services) and a systemic systematization, Shareway provides a comprehensive compendium of knowledge on the current state of shared mobility research and practice. The secondary analysis that was performed systematically compiles the state of knowledge and thereby identifies knowledge gaps and further research and funding needs. Potential development paths were shown in a total of eight future scenarios for shared mobility in thesis form. From these it is possible to deduce control possibilities for the state sector as well as targeted promotion measures and research commissions, in order to integrate the current market-driven "trial and error" in shared mobility more effectively in an overall transport strategy and to make the actual benefits more verifiable.

**Contact:**
Lukas Foljanty, KCW

**Project partner:**
Institut für Ökologische Wirtschaftsforschung (IÖW) GmbH,s

**Project runtime:** 02/2015 – 02/2016

**Research associates:**

**Final report:**

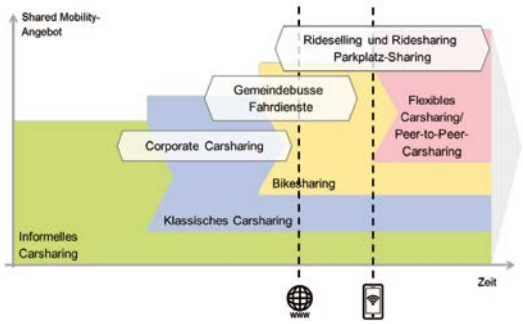



Figure: Development of shared mobility


Figure: Selected future scenarios for Shared Mobility 3.0

Wifas

# Model for assessing social impacts for the mobility of persons and goods

The goal of the R&D service was the development of a concept for the assessment of program-induced, socially relevant social impacts of RTI programs in the mobility area. In doing so the following questions were addressed:
(a) What social effects occur or are observable in these programs? (b) Which methods and indicators can be used to detect and depict them? and (c) How can the impact contribution of the programs be localized? The results consist of two empirically verified impact models; one for goods mobility and one for personal mobility. In the future the impact models should serve as a basis for assessing the socially relevant, social impact dimensions of research promotion programs in the mobility area.

*"The WIFAS project laid the conceptual and empirical foundation for a comprehensive assessment of social impacts of personal and goods mobility measures, which until now had only been briefly summarized. This should now be used to include social effects ex-ante in project development and to study the actual social impacts of interventions ex-post. Through the methodical implementation thereof, Austria will be able to assume a pioneering role in Europe and beyond."*

**Contact:**
Dr. Peter Kaufmann, KMU Forschung Austria - Austrian Institute for SME Research

**Partner:**
netwiss OG

**Final report:**

Dr. Peter Kaufmann, KMU Forschung Austria - Austrian Institute for SME Research

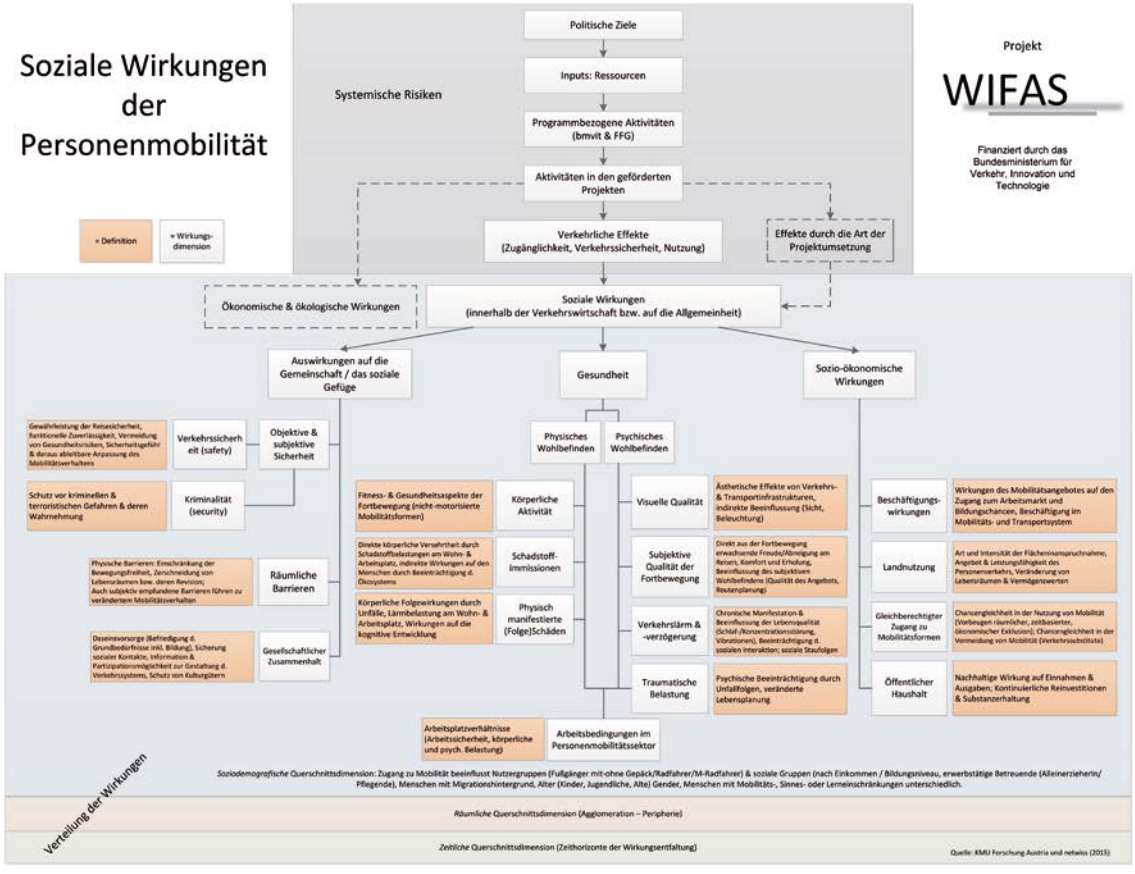



Figure: Personal mobility impact model

# Other R&D services still underway:

REBOUND
## Dynamics and prevention of rebound effects with mobility innovations
**Contact:** Dr. Sebastian Seebauer, JOANNEUM RESEARCH Forschungsgesellschaft mbH
**Partners:** Technische Universität Wien - Department für Raumplanung, FB Finanzwissenschaft und Infrastrukturpolitik

SAMOA
## Sustainability Assessment for Mobility in Austria
**Contact:** Mag. Bernhard Fürst, TRAFFIX Verkehrsplanung GmbH
**Partners:** ÖIN - Österreichisches Institut für nachhaltige Entwicklung, PlanSinn Büro für Planung und Kommunikation GmbH

AEIOU
## Application possibilities, experiences, added value generation, and indicator formation on the basis of Österreich Unterwegs
**Contact:** Dr. Max Herry, Herry Consult GmbH
**Partners:** Universität für Bodenkultur Wien - Institut für Verkehrswesen, TRAFFIX Verkehrsplanung GmbH, TU Wien - FB Verkehrssystemplanung | Department für Raumplanung

AEIÖU
## Exploiting the explanatory content in Österreich Unterwegs
**Contact:** Univ. Prof. Dr. Thomas Macoun, TU Wien - Institut für Verkehrswissenschaften
**Partners:** tbw research GesmbH, Bundesanstalt Statistik Österreich

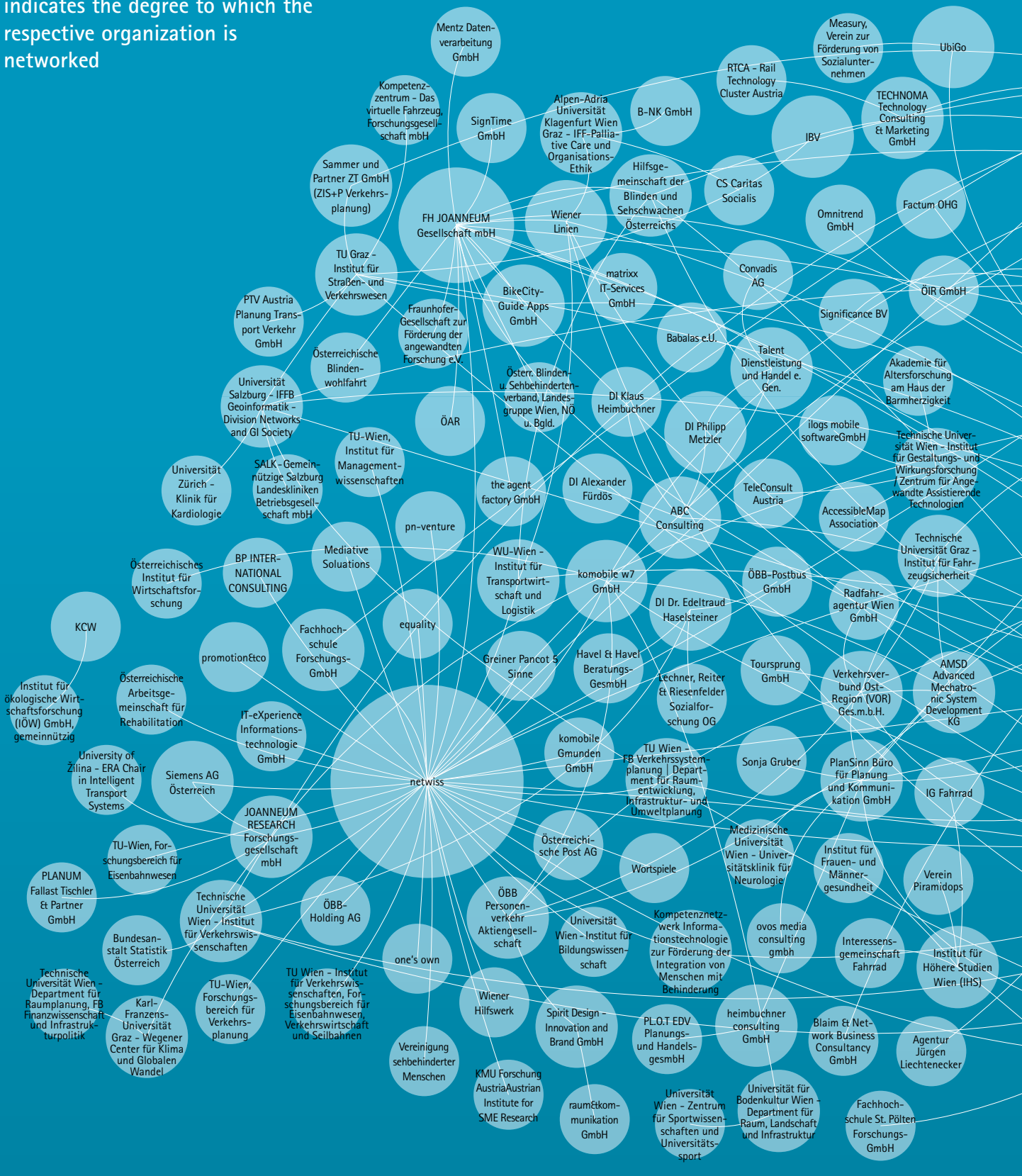
DISCOVER
## Demonstration of an optimum use and technology-supported expansion of Österreich Unterwegs in transport planning
**Contact:** Jaqueline Aspäck, BSc, IKK Kriebernegg-Kaufmann ZT-GmbH
**Partners:** AIT Austrian Institute of Technology GmbH, Snizek + Partner Verkehrsplanungs GmbH

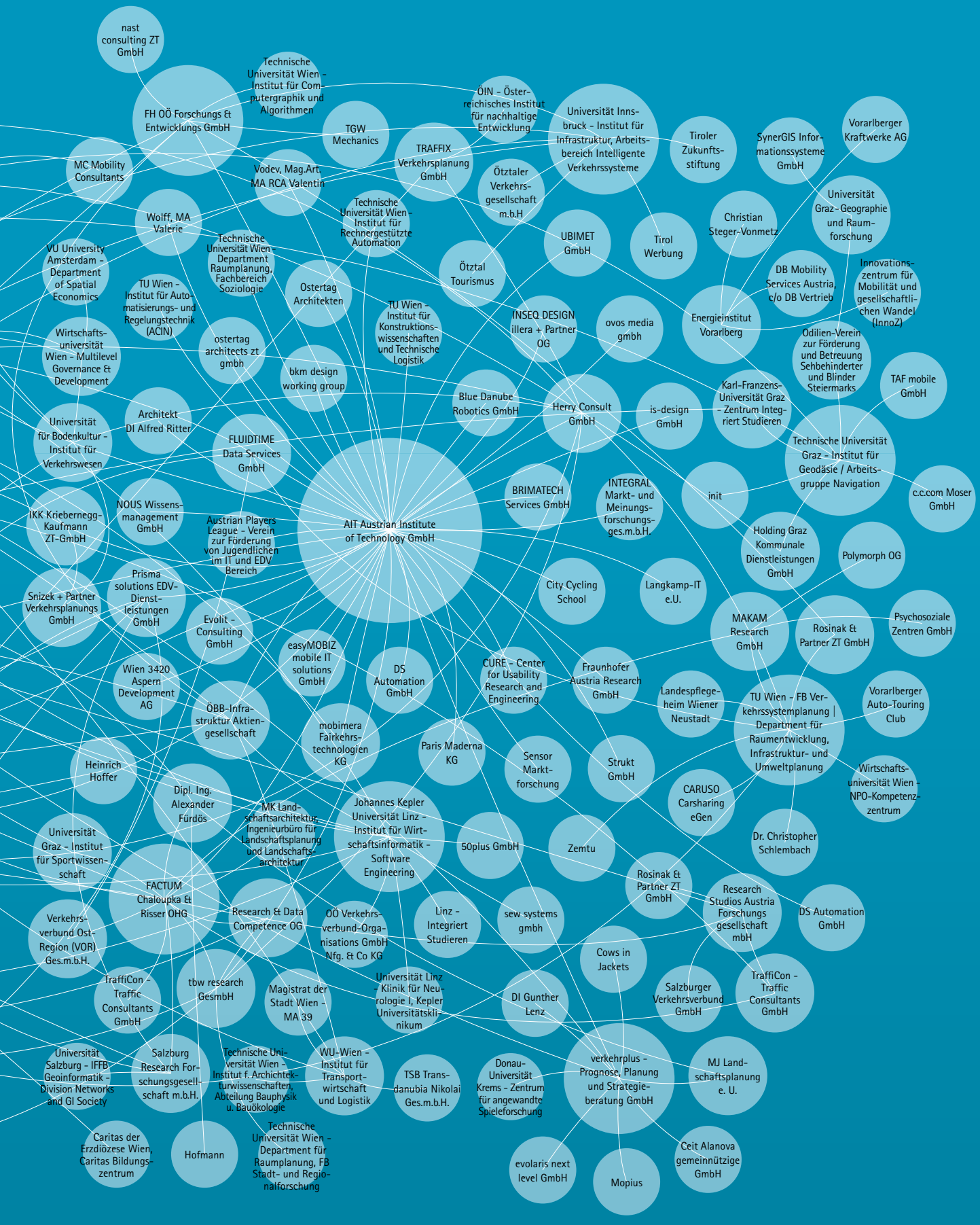
Input-ÖU
## Added value through innovative imputation and weighting to supplement unreported avenues for Österreich Unterwegs
**Contact:** Prof. Dr. Gerd Sammer, Sammer und Partner ZT GmbH (ZIS+P Verkehrsplanung)
**Partners:** Herry Consult GmbH

# 6. Creating networks.

**The network of research stakeholders, who carried out bmvit-granted national RTI projects in the personal mobility area in the years 2012–2017 (ways2go/IV2Splus 4th call for proposals, Mobility of the Future 2nd/4th/6th call for proposals, Urban Mobility Laboratories), will be depicted in the following.**

**The diagram shows the project-by-project interconnections of the partners. The size of the circles indicates the degree to which the respective organization is networked**




nast consulting ZT GmbH
Technische Universität Wien - Institut für Computergraphik und Algorithmen
FH OÖ Forschungs & Entwicklungs GmbH
TGW Mechanics
ÖIN - Österreichisches Institut für nachhaltige Entwicklung
Universität Innsbruck - Institut für Infrastruktur, Arbeitsbereich Intelligente Verkehrssysteme
Tiroler Zukunftsstiftung
SynerGIS Informationssysteme GmbH
Vorarlberger Kraftwerke AG
MC Mobility Consultants
TRAFFIX Verkehrsplanung GmbH
Vodev, Mag.Art. MA RCA Valentin
Ötztaler Verkehrsgesellschaft m.b.H
Universität Graz - Geographie und Raumforschung
Wolff, MA Valerie
Technische Universität Wien - Institut für Rechnergestützte Automation
UBIMET GmbH
Tirol Werbung
Christian Steger-Vonmetz
VU University Amsterdam - Department of Spatial Economics
Technische Universität Wien Department Raumplanung, Fachbereich Soziologie
Ötztal Tourismus
DB Mobility Services Austria, c/o DB Vertrieb
Innovationszentrum für Mobilität und gesellschaftlichen Wandel (InnoZ)
TU Wien - Institut für Automatisierungs- und Regelungstechnik (ACIN)
Ostertag Architekten
TU Wien - Institut für Konstruktionswissenschaften und Technische Logistik
INSEQ DESIGN illera + Partner OG
ovos media gmbh
Energieinstitut Vorarlberg
Wirtschaftsuniversität Wien - Multilevel Governance & Development
ostertag architects zt gmbh
bkm design working group
Odilien-Verein zur Förderung und Betreuung Sehbehinderter und Blinder Steiermarks
TAF mobile GmbH
Blue Danube Robotics GmbH
Herry Consult GmbH
is-design GmbH
Karl-Franzens-Universität Graz - Zentrum Integriert Studieren
Universität für Bodenkultur - Institut für Verkehrswesen
Architekt DI Alfred Ritter
FLUIDTIME Data Services GmbH
Technische Universität Graz - Institut für Geodäsie / Arbeitsgruppe Navigation
c.c.com Moser GmbH
BRIMATECH Services GmbH
INTEGRAL Markt- und Meinungsforschungsges.m.b.H.
init
IKK Kriebernegg-Kaufmann ZT-GmbH
NOUS Wissensmanagement GmbH
Austrian Players League - Verein zur Förderung von Jugendlichen im IT und EDV Bereich
AIT Austrian Institute of Technology GmbH
Holding Graz Kommunale Dienstleistungen GmbH
Polymorph OG
Prisma solutions EDV-Dienstleistungen GmbH
City Cycling School
Langkamp-IT e.U.
Snizek + Partner Verkehrsplanungs GmbH
Evolit - Consulting GmbH
MAKAM Research GmbH
Rosinak & Partner ZT GmbH
Psychosoziale Zentren GmbH
easyMOBIZ mobile IT solutions GmbH
DS Automation GmbH
CURE - Center for Usability Research and Engineering
Fraunhofer Austria Research GmbH
Wien 3420 Aspern Development AG
Landespflegeheim Wiener Neustadt
TU Wien - FB Verkehrssystemplanung | Department für Raumentwicklung, Infrastruktur- und Umweltplanung
Vorarlberger Auto-Touring Club
ÖBB-Infrastruktur Aktiengesellschaft
mobimera Fairkehrstechnologien KG
Paris Maderna KG
Sensor Marktforschung
Strukt GmbH
Heinrich Hoffer
Wirtschaftsuniversität Wien - NPO-Kompetenzzentrum
Dipl. Ing. Alexander Fürdös
MK Landschaftsarchitektur, Ingenieurbüro für Landschaftsplanung und Landschaftsarchitektur
Johannes Kepler Universität Linz - Institut für Wirtschaftsinformatik - Software Engineering
CARUSO Carsharing eGen
Universität Graz - Institut für Sportwissenschaft
50plus GmbH
Zemtu
Dr. Christopher Schlembach
FACTUM Chaloupka & Risser OHG
Rosinak & Partner ZT GmbH
Research Studios Austria Forschungsgesellschaft mbH
DS Automation GmbH
Research & Data Competence OG
OÖ Verkehrsverbund-Organisations GmbH Nfg. & Co KG
Linz - Integriert Studieren
sew systems gmbh
Verkehrsverbund Ost-Region (VOR) Ges.m.b.H.
Cows in Jackets
TraffiCon - Traffic Consultants GmbH
tbw research GesmbH
Magistrat der Stadt Wien - MA 39
Universität Linz - Klinik für Neurologie I, Kepler Universitätsklinikum
DI Gunther Lenz
Salzburger Verkehrsverbund GmbH
TraffiCon - Traffic Consultants GmbH
Universität Salzburg - IFFB Geoinformatik - Division Networks and GI Society
Salzburg Research Forschungsgesellschaft m.b.H.
Technische Universität Wien - Institut f. Archichtekturwissenschaften, Abteilung Bauphysik u. Bauökologie
WU-Wien - Institut für Transportwirtschaft und Logistik
TSB Transdanubia Nikolai Ges.m.b.H.
Donau-Universität Krems - Zentrum für angewandte Spieleforschung
verkehrplus - Prognose, Planung und Strategieberatung GmbH
MJ Landschaftsplanung e. U.
Caritas der Erzdiözese Wien, Caritas Bildungszentrum
Hofmann
Technische Universität Wien - Department für Raumplanung, FB Stadt- und Regionalforschung
evolaris next level GmbH
Mopius
Ceit Alanova gemeinnützige GmbH

# 7. Trans-border Cooperation

**For RTI stakeholders, cooperation across borders leads to better capabilities and higher quality research results. Knowledge can be synergetically linked and cross-border solution approaches become possible in European and transnational projects. Austrian research stakeholders are able to establish themselves in international research and innovation networks and develop new markets for innovative products and services. From the standpoint of a mission-oriented program, the national resources employed are additionally strengthened and critical project masses are reached, thus making it possible to provide better support for innovations in the personal mobility area.**

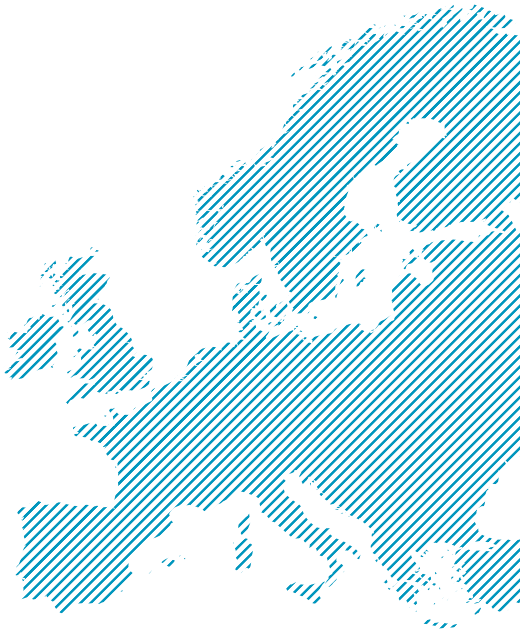
# Relevance of European research cooperations to topic-specific research on the national level


On the European level, considerable financial resources were provided over the last few years for research in the transport area. European research and innovation sponsorship programs such as Horizon 2020 (H2020) will form an important supplement to national R&D promotion in the coming years as well.

From the national perspective, however, Horizon 2020 should not be seen as just another funding option for R&D, but chiefly as an important resource for gaining access to research results in the European research area, which can subsequently be used for innovation and new solutions for personal mobility in and by Austria. There is considerable interest in gaining access to the latest research and development efforts, which are important for further activities but which cannot be rendered exclusively from the Austrian side. Filling knowledge and know-how gaps on the part of Austrian stakeholders via European cooperation projects is thus obvious.

From a RTI policy perspective, it is necessary to find a good balance between various positionings of the national R&D grants in proportion to the European ones. In the "personal mobility" thematic field, this means that national promotion efforts should prepare Austrian R&D stakeholders for investments in Horizon 2020. Capability to tie in with Horizon 2020 is just as necessary for this as a certain amount of complementarity.

# National and European research promotion in the mobility and transport field: Differences and commonalities



One the one hand, the national research promotion programs enable upstream research with a manageable level of administrative complexity, which can pave the way to more complex European research projects in a further step. National stakeholders can develop the know-how and networks that are necessary for this. On the other hand, the national programs in Austria traditionally exhibit clear complementarity in terms of content and distinguishing features in comparison to the European programs, which provide Austrian stakeholders with additional options for action and frequently a headstart in their research and innovation activities. In the past, it was not uncommon for national program structure to be given stronger, albeit delayed, consideration on the European level (in subsequent work or framework programs).

An Austrian pioneering role in mission-oriented transport and mobility research is particularly evident when one looks on the European level. The current EU framework program H2020 still designates transport (Smart, Green and Integrated Transport) as a "major social challenge" in column 3 and thus essentially perpetuates the modally structured chapter from the 7th EU Framework Program. In Austria on the other hand, the previous "Intelligent Transport Systems and Services plus (IV2Splus) (2007-2012) program had already abandoned a modal logic in favor of a systemic general perspective. Mobility of the Future is furthermore setting a clear systemic priority with the personal mobility thematic field, which goes beyond modal or partially systemic limits. Users and behavior-relevant aspects are thus prioritized in the considerations. The focus is placed on an integral consideration of mobility (as a consequence of activities of everyday life), rather than focusing on "transport" on a sectoral basis. Thus interdisciplinary research approaches are just as much an integral component as a broader innovation understanding ranging from technological to social and organizational innovations.

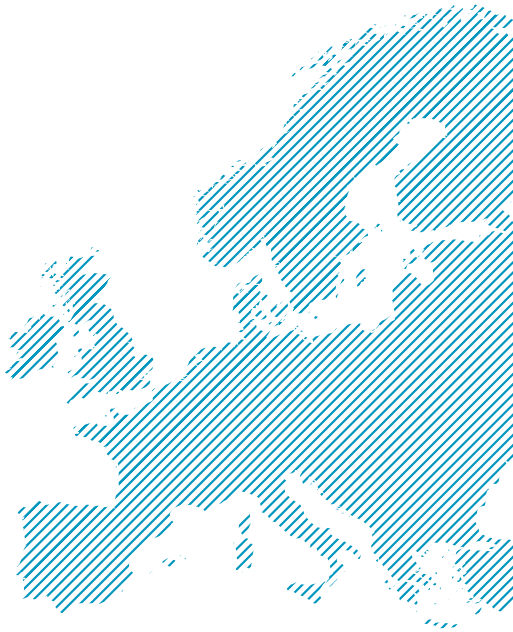
# "Shaping personal mobility in an innovative way" in H2020?

The relationship of national promotion in the personal mobility area to the H2020 chapter "Intelligenter, umweltfreundlicher und integrierter Verkehr" [Intelligent, green, and integrated transport] can be established on the basis of the following four goals:

- Resource-conserving, green transport
- More mobility, less traffic volume, more safety
- Leading role of the European transport industry worldwide
- Socio-economic research and future-oriented activities for political decision making

The three priority research fields of the personal mobility thematic field enable the development of and the linkage with sound national research know-how. Socioeconomic mobility research is a high priority in the thematic field. This gives rise to good connectivity with European activities.

With "urban mobility", a fifth mode that is heavily focused on personal mobility was virtually established in H2020. As a complement to technological aspects, H2020 Transport is also dedicated explicitly to research questions pertaining to new mobility concepts, transport organizations, multimodal access models, increased efficiency in public transport and non-motorized soft mobility as an alternative to motorized private transport. This in part reflects the content alignment of the national thematic field of personal mobility with priorities such as "active mobility" and "multimodal lifestyles".



# From national thematic research to successes on the European level

In connection with the topic-specific national research on personal mobility in programs that led up to Mobility of the Future (IV2Splus/ways2go) and earlier EU research framework programs, the results of the "Leistungsfähigkeit und Entwicklungspfade von Forschung und Entwicklung im österreichischen Transportsektor im europäischen Kontext" [Performance capability and development paths of research and development in the Austrian transport sector in the European context] (P. Biegelbauer, AIT 2015) study are worth mentioning. Along with patents, the relative pros and cons of specialization with regard to specific research areas in the transport sector, as well as the European networking of Austrian RTI stakeholders in different research areas in the transport sector, were examined in detail in this study. It turns out that specific Austrian areas of strength are not just found in technology fields such as the railroad and motor vehicle sectors. In the 7th framework program for instance, the topic "Encouraging and increasing modal shift" (i.e. prioritization of behavior change on the national program level) shows the greatest specialization advantages by far in the entire "Transport" chapter, in terms of both successful Austrian consortium leaders and funding volume achieved. Furthermore, Austria shows a high level of activity in intermodal R&D projects and in socio-economic research.

However, Austrian stakeholders can also report remarkable successes in the European H2020 calls for bids of the last few years and can record significant sums in European subsidies for Austria. Austrian research stakeholders are represented in each 6th H2020 transport project and the success rate (successful submitters in proportion to all submitters) is considerably above the European average. The "return flows" in the transport area have increased by half compared to the 7th framework program. Compared to the Austrian contributions to the EU research budget (2 %), national stakeholders receive nearly two euros in return for every euro paid to Brussels (3.8 %).

| H2020 information Transport General Aust. investment | All States | Austria | Percent out of all states |
|---|---|---|---|
| Projects | 591 | 102 | 17.3 % |
| Investments | 4 002 | 170 | 4.2 % |
| Subsidies (M€) | 1 588 710 534 | 60 921 720 | 3.8 % |
| Coordinations | 591 | 24 | 4.1 % |
| Participation in contracts | 3 151 | 124 | 3.9 % |
| Success rate | 30.5 % | 42.4 % | |

Figure: Key data on Austrian investment in H2020 through 2016, source: FFG based on eCorda data of the EC

# ERA-Net Transport as a coordination platform for transnational research projects

Despite the considerable resources of European research framework programs, the majority (> 80 %) of the research promotion resources are being provided from national or regional funding pools, and will be in the future. Hence it is assumed that there are considerable synergies for a transnationally coordinated use of resources in the mobility and transport area too.

In the last few decades, the European Commission has been supporting the coordination of national and regional research programs and the cooperation of program owners and coordinators in the scope of the ERA-Net Transport (ENT, 2004-1016) project series. An extensive cooperation network across 18 countries and regions came into being in the scope of these initiatives, which will also be continued beyond the year 2016 (without support from the European Commission).

ENT activities ranged from knowledge and information exchange and thematically relevant programs to joint research tendering. On this basis, several research proposals jointly funded by the Member States and the European Commission have since been developed and implemented (ERA-NET+ Eletromobility, ERA-Net Cofund Electric Mobility Europe). The bmvit had a leading role in the development of this network and in all important network activities from the beginning on. A portion of the national program funds from Mobility of the Future have been and will be awarded in the scope of coordinated ENT calls for proposals.

ERA-Net Transport

# Coordinated research in the personal mobility thematic field – ENT Flagship Call 2013

The ENT-Flagship Call "Future Travelling", which took place in 2013, is worth mentioning as being of particular thematic relevance to the personal mobility thematic field. 10 nations and regions participated in this coordinated call for proposals, with over 10 million euros invested. Austrian researchers are substantially involved (with approx. 1.3 million euros of the subsidy funds) in three out of the 8 transnational research projects resulting from this call (see chapters 3 and 4 for the descriptions of the aim4it, Guide2wear, and Perron projects).

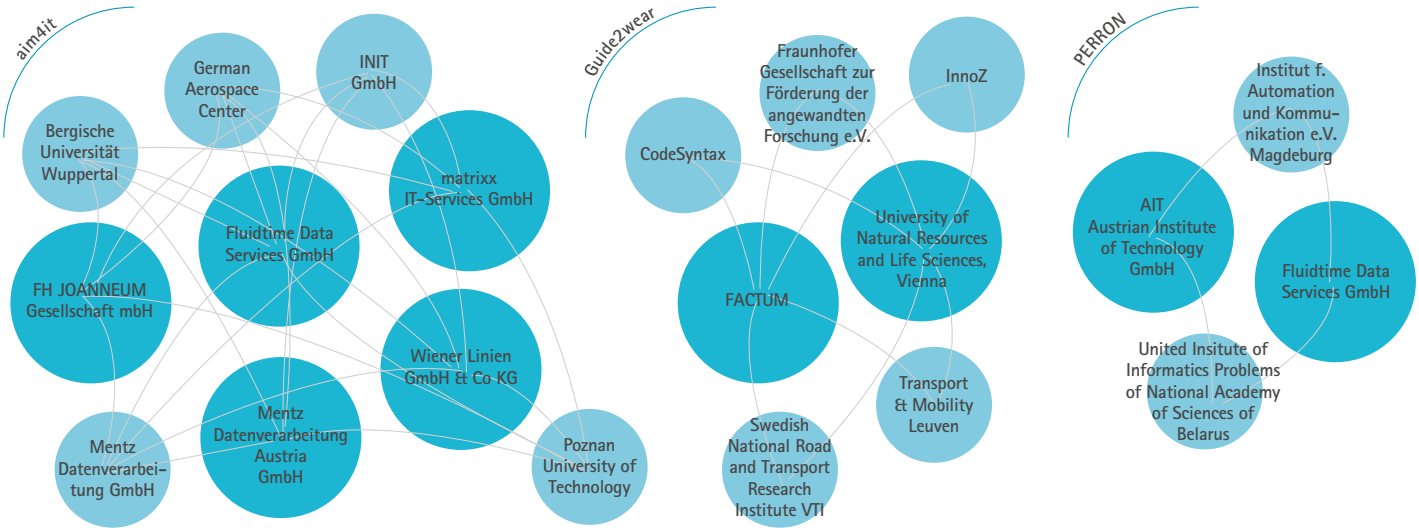



Figure: Transnational cooperation networks of Austrian partners, using the research projects from the ENT "Future Travelling" call for bids as an example.

# 8.
# Creating structures.
# Closing gaps.

URBANE MOBILITÄTS LABORE

# Urban mobility laboratories (UML) – Using experimental environments to make research effective

## Urban mobility in the real-world laboratory

Due to the highly dynamic development in urban-suburban areas, issues relating to mobility and transport represent a growing challenge on all levels. By the same token, urban and suburban environments also offer new opportunities as "crystal nucleii" for innovations.

However, research projects often fail to reach their full potential impacts in terms of the program objectives due to limited opportunities and framework conditions. To support the actual research activity, measures therefore need to be taken in order to

- Create suitable spaces of opportunity for new approaches and an open innovation climate,
- Include users and key stakeholders in research on a continuous basis,
- Do a better job of integrating research in political strategies and measures,
- Recognize and eliminate implementation barriers (early) or actively design the necessary framework conditions for doing so,
- Develop measures and project clusters that are effective in terms of integration,
- Build research infrastructure and make it synergistically usable,
- Continue pursuing implementation measures, even beyond research project runtimes,
- Establish long-term "learning spaces" for impacts of RTI in the mobility system, etc.


Figure: Wordcloud explaining the goals and functions of urban mobility laboratories; own diagram, bmvit/ Austriatech 2016

Urban mobility laboratories supplement research and innovation projects relating to mobility through novel, local, and regional structures in the urban realm. Experimental accesses and "real time experiments" not only increase the practical relevance of research, but also support the diffusion of results in social practice as well as the necessary transition processes more effectively. Through these interventions, the innovation process will be broadened in scope and existing gaps in the Austrian innovation (promotion) landscape will be closed.

**Urban Mobility Laboratories**

**Open Innovation Strategy for Austria**

Urban mobility laboratories are listed as an example of implementation in the "Open Innovation Strategy for Austria".

## The path to urban mobility laboratories

During an exploratory phase (2014-2015), various concepts of UMLs were studied in terms of their feasibility in eight exploratory projects, and the experiences gained were incorporated in accompanying study. In parallel and in direct liaison with the projects, a new "innovation laboratories" funding instrument was developed and used for the first time during the UML implementation phase (7th call for bids by Mobility of the Future in May 2016).

In the metropolitan areas of Vienna, Graz, Linz, and Salzburg, this gave rise to new carrier structures and powerful innovation networks for supporting transport- and mobility-oriented research with different focuses in the areas of goods and personal mobility. To this end, five UML projects were funded by bmvit/FFG for a 4-year runtime.

## UML activities and research projects in the personal mobility thematic field

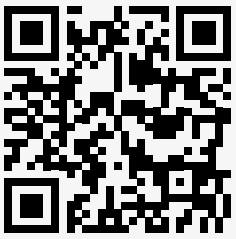
Urban mobility laboratories address different priorities in the thematic field and create structures, processes, and infrastructure for supporting topic-relevant research projects or other innovation-relevant activities (innovation initiatives). As a "start-up package", each UML defines a group of innovation initiatives at the outset. This portfolio will be expanded in the coming years to include additional national and European research initiatives.

UML activities should include the upstream and downstream and/or accompanying processes of RTI (e.g., initiation/enabling, support/coordination, continuation/implementation) that research projects themselves would either not be able to carry out at all or else only in an unsatisfactory manner. Overarching activities for verifying the effectiveness of these processes and assuring that they take place should also be included. UML activities thus create a support framework that complements research for more efficient innovation processes and for enabling society to generate more value from research pertaining to mobility and transport in the urban setting. In the future, research initiatives will be able to avail themselves of the growing range of services of urban mobility laboratories.

In the following pages, the individual urban mobility laboratories will be described in terms of their orientations, target groups, their ranges of services, and specific innovation initiatives. It should be noted that while the projects reflect the funding decision of the bmvit, no funding contracts had been signed when this publication went to press.

UML exploratory project

UML accompanying study



ASPERN.MOBIL LAB

# The aspern.mobil LAB urban mobility laboratory

With aspern.mobil LAB, an environment will be created in Aspern, Vienna's Urban Lakeside, in which residents, researchers, city authorities and businesses can jointly contribute to the development towards sustainable urban mobility. The goal of aspern.mobil LAB is to establish and support a novel mobility and innovation culture locally. Vienna's Urban Lakeside should thus become a local lighthouse project for the Innovation Site Austria. The aspern.mobil LAB represents modern mobility and innovation culture in every way. Urban Lakeside residents, local stakeholders, and R&D players think, develop, and act jointly and on equal terms here. Because of the ideal transfer features of Aspern, the focus is on neighborhood-related mobility. With this lab, it may be possible to reduce the costs of R&D processes that involve user participation and to provide the necessary know-how for successfully implementing mobility innovations in other cities and urban districts beyond the project runtime.

Figure: Vienna's Urban Lakeside is growing steadily: more than 20,000 persons will be living here and as many as 20,000 will be working here by the year 2030.

The exploratory work made it possible to come up with a first approach for a preliminary project agenda, which includes some very concrete project initiatives. These are described in detail in terms of aspern.mobil LAB services. Examples include: LARA Share, the goal of which is to develop an integrated online platform for neighborhood-based P2P components of cargo bikes and cargo bike parking areas. VBB ultimate: The goal of this research project is to gain insights into the preferences of cyclists in terms of bikeability environmental factors, in order to come up with recommendations for planning bicycle transport facilities. AALmobicargo: An integrated crowd logistics service in the form of a Tablet app is being developed in this project. According to the Shareconomy principle, the project provides support for using common private capacities for the delivery, transport and handover of objects, and for shopping.

*"In an urban district where everyone is new, it is easier to rethink old routines in general, not just in terms of mobility. This is linked to the goal of establishing a mobility and innovation culture that will be supported by persuasive mobility offerings. The conditions of Vienna's Urban Lakeside make it an ideal laboratory for developing innovative applications in the mobility area."*

Lukas Lang, Projektmanager UVP und Verkehr, Wien 3420 Aspern Development AG

*"The opportunity for the mobility laboratory to remain productive in Vienna's Urban Lakeside for many years is linked to the responsibility of making a genuine contribution to the co-designing of a novel urban mobility, which uses resources more responsibly and cautiously co-designs the urban environment. This is possible in Vienna's Urban Lakeside. The local conditions are ideal for establishing an innovation culture that uses businesses and residents. Together with all local stakeholders, Vienna's Urban Lakeside has the potential to show the way for other neighborhoods to follow."*

Mathias Mitteregger, Future Lab, Projektleiter Avenue 21

**Thematic priorities:**
In terms of topics,the development of aspern.mobil LAB is pursuing two innovation paths – active mobility and (Shared) Mobility as Service+. This research orientation focuses on the fact that people in the Urban Lakeside are able to rely less on their own cars and more on attractive mobility alternatives such as walking, bicycling, scootering and roller blading (active mobility) or on integrated mobility services ("Mobility as Service") such as car sharing.

**Network:**
The Wien 3420 Aspern Development AG, das Stadtteilmangement Seestadt aspern, the Jauschneg Office, and the Neue Urbane Mobilität Wien GmbH are key aspern.mobil LAB partners. This project is being supported by approx. 30 LOI donors such as InnoZ Berlin, Wirtschaftsagentur Wien, United in Cycling, etc.

**Contact:**
Prof. Martin Berger,
TU Wien

**Project runtime:** 03/2017 – 02/2021

**Research associates:**

GRAZ GRENZENLOS

# Urban Mobility Laboratory Graz grenzenlos

The Graz region is one of the areas most heavily contaminated by particulate matter in all of Austria. One of the main causes of this is motorized private transport, which will increase due to the expected influx of people into the region in the coming years. Even now approx. 570,000 car trips are made daily in Graz. The percentage of motorized private transport drivers in the modal split has been increasing steadily since 1982, reaching 45 % in 2013. Comprehensive measures in the mobility area are therefore needed in order to improve the quality of life for the residents of Graz, both now and for the future.

Figure: Involvement of users as a central principle (1st Mobility Rendezvous in July2015/exploration)

The Graz grenzenlos ["Graz borderless"] Mobility Laboratory is primarily active in Graz and in the greater metropolitan area of Graz. However, the geographical impact of the lab is even further reaching, as exemplified in the Graz - Gleisdorf innovation axis.

The Graz grenzenlos Mobility Laboratory pursues the overarching goal of reducing the daily flows of motorized traffic. It supports technological, social, and institutional innovations in the mobility area, with the aim of bringing products and services to market readiness faster.
The involvement of users in the development and test process substantially improves the chances of innovations being implemented and introduced on the market. Businesses (start-ups, SMCs, industry), research institutions, and other supporters of innovation initiatives profit from the fast, standardized, and cheaper test options offered by the infrastructure, the method pool, and the concentrated know-how of the Mobility Laboratory. The benefit for the City of Graz and the Province of Styria lies in the positioning of the region as an area of innovation and consequently in the strengthening of the business location.

Figure: Exchange among science, administration, and citizens: Prof. Sibylla Zech 1st Mobility Rendezvous in July2015/exploration)

Innovation initiatives profit from comprehensive support with expert know-how from different disciplines. Living lab approaches as well as innovative methods from action and perception research are offered. The mobile infrastructure (bus, container) of the Mobility Laboratory enables it to go out to the residents and travelerss in a deliberate manner. Innovation areas offer test environments in the public realm that permit developments to be tested under diverse actual starting conditions. Grazgrenzenlos furthermore offers data packets of guaranteed quality and practical guidelines for fulfilling data protection requirements. Depending on the respective innovation initiative, the methods employed range anywhere from stakeholder analyses to investment and innovation methods such as design thinking to measuring and monitoring tools, prepared data packets, services for data analysis, depiction, etc.

The Graz grenzenlos Mobility Laboratory is an open innovation platform and it works with a broad spectrum of stakeholders from the mobility realm:
Politics and administration (City of Graz, suburban communities, Province of Styria, regional management), citizens, advocacy groups, NGOs, citizens' initiatives, private and public mobility service providers, private business and public enterprises (from startups and technology suppliers to developers and industry), and science and research institutions.
The users, or rather citizens, play a special role as creative idea providers, as participants in (further) development, or as prototype testers. One of the things that was created for this purpose was a user panel, through which interested users can become involved in specific development processes.

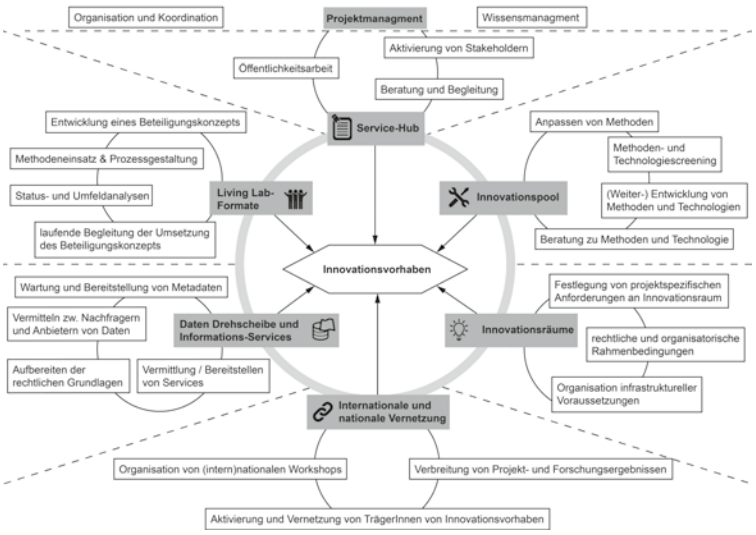



Figure: Range of services offered by "Graz Grenzenlos" for innovation initiatives

## Preliminary innovation initiatives are planned in the following areas:

### Innovation Initiative Example 1: Graz – Gleisdorf suburban railway

- Cooperative development and implementation of an innovation and technology portfolio for selected development initi atives around the rail hubs on the Gaz - Gleisdorf corridor

### Innovation Initiative Example 2: City-Hub Concept Graz

- A logistics hub close to downtown will optimize the first/last mile delivery of goods and design it in a sustainably "greener" manner, especially in the B2B area. The concept of a trans-shipment hub will be applied to both downtown Graz and new city districts.

### Innovation Initiative Example 3: CENTRO

- The goal is to design a system in which regional buses influence traffic light systems. Appropriate corridors will be traveled by city as well as regional bus lines, wherein the former are already using prioritization circuits. Measures are being pursued for prioritizing regional bus lines and thus making public transport more attractive, especially for commuters.

*"Because of above average growth, metropolitan Graz is faced with major challenges. The fulfillment of mobility needs in conjunction with the simultaneous development of life quality demands a turnaround in mobility – shaping future mobility, networking relevant infrastructure projects, and trying out technological innovations and generating acceptance through citizen participation are factors for the success of future sustainable mobility solutions."*

DI Robert Schmied, Geschäftsführer e-mobility Graz GmbH

*"The diverse challenges associated with the mobility and transport topic demand new solution approaches – not only technological but also social innovations are needed. In the 'Graz grenzenlos' Living Lab, users become generators of ideas, active participants, and critical testers. This is a great opportunity to implement new products, services, and concepts successfully and further strengthen the region of Graz as a leading mobility site."*

Mag. Dr. Stefan Kollarits, Geschäftsführer PRISMA solutions GmbH

**Thematic priorities:**
The solution approaches of the Graz grenzenlos Mobility Laboratory are reflected in four fields of innovation:

a. Influencing mobility awareness and behavior toward environmental alliances
b. Transport management 2.0
c. Urban-regional logistics and
d. Autonomous driving

Two to three innovation initiatives have already been planned for each of the four innovation fields.

**Network:**
The following partners with the following skill sets are represented in the laboratory team:

- E-Mobility Graz GmbH: Project management, connection to administration, intelligent mobility services
- Holding Graz: Public transport offerings
- StadtLABOR: Citizen participation , Living Lab processes, process architecture
- TU Graz: Logistics, urban construction, smart cities, science, research and teaching
- TU Wien: Science, research and teaching, mobility management, regional and land use planning
- PLANUM: Transport models and simulation, mobility planning
- PRISMA solutions: Software development, data management, project management

**Contact:**
DI Robert Schmied,
e-mobility Graz GmbH

**Project runtime:** 06/2017 – 06/2021

**Research associates:**

MOBILAB OÖ

# Mobility Laboratory Central Upper Austria

In keeping with the priorities in central Upper Austria (Linz, Steyr, Wels corridor), the focus of MobiLab OÖ [Mobility Laboratory Central Upper Austria] is chiefly on the traffic flows being induced by business activity. Examples of this in personal transport are rush-hour traffic, business trips, client travel and visitor traffic. Delivery, production, and shipment transport, including disposal, account for the majority of the traffic flows in the mobility of goods area. With the aid of a modular, mobile innovation area, data are obtained on social and business processes and dynamics, and an open-ended approach is used for testing and analyzing new ideas. The methodology employed in the MobiLab is oriented along the lines of the socalled design thinking process. This involves shedding light on the various facets of the complex problem, and building a rapport with the target group in order to understand their needs and perceptions. The generation and further development of ideas is also made possible. In the subsequent phases, prototypes are developed from preliminary concepts and tested by the target group. Use is also made of modular and mobile technology sets. On the one hand, these serve as support within the individual process phases (e.g., Tablets and cameras in the field observation phase). On the other hand, they should be used to make preliminary prototypes possible (e.g., augmented reality gadgets for using real time information). These technology sets are built locally in the laboratory, as so-called case systems.

### Innovation Initiative 1) Last Mile – Delivery Service 4.0

The focus in this initiative is specifically on the interaction between humans and machines in the delivery of goods within the last mile, wherein the use of automated devices represents an especially interesting test within the established experimentation structure. Other possible designs will also be considered in this initiative, for instance involving the Crowd as package carriers.

### Innovation Initiative 2) Private-Public Mobility Service – Multimodal Lifestyles

The concrete innovation initiative prioritizes "multimodal mobility" as a service at the interface between industrial sites and adjacent public space. With the MobiLab, the idea is to optimize the interface and hence the information flow between public space (e.g., public transport schedules, need for bike sharing services, etc.) and the industrial area (operation times, common commuter traffic flows, etc.).

### Innovation Initiative 3 – Last Mile – "City Logistics Hub"

In this initiative, the idea is to decouple the transport of goods by road from private transport in an event-related manner and in real time. Modified business strategies and more cross-business thinking and action are the key impulses in this innovation initiative.

## The following figures illustrate the MobiLab innovation approach:


The picture shows a CEP service provider with a delivery within the pedestrian zone. The challenges (noise, not much room, timely delivery, etc.) in the last mile area are considerable!


In MobiLab OÖ, we want to find creative people who will actively contribute to finding regional solutions (keyword: co-creation) and then investigate the so-called problem space in the "real world".


The people then turn into the solution space, where they generate ideas together (in a creative environment). A prototyping phase for preliminary testing is also possible here.

Lastly, iterative loops between the individual steps should lead to a testing and experimentation field, in which new mobility solutions are tried out and eventually implemented.

*"Our mission is to create an environment for creative problem solving and innovative ideas, to interlink the key stakeholders and jointly design the future of mobility by taking new paths."*

MA, Christian Haider, FH OÖ – Logistikum Steyr

**Thematic priorities:**
The MobiLab OÖ pursues the strategy of generating mobility innovations in a structured manner, without a previously established solution, in the face of open mobility problems. On the basis of results from exploratory projects, two thematic fields were defined at the outset. Specifically, these are the "last mile" (e.g., delivery service and city logistics) and "private-public mobility services" (e.g., mobility as a service) areas.

**Network:**
The partners of the Cities of Linz, Wels, and Steyr are essential to the Mobility Laboratory. The laboratory also focuses strongly on business activities. Especially worth mentioning here are the cooperations with advocacy groups (Vereinigung der Österreichischen Industrie, TIC Steyr GmbH, Verein FAZAT, Institut für Angewandte Umweltbildung, Verein Netzwerk Logistik). Both national and international players (Austrian Institute of Technology, evolaris next level GmbH, Universität Nürnberg und Braunschweig, Wuppertal Institut) are involved in the area of scientific and technical partnerships.

**Contact:**
MA Christian Haider,
FH OÖ Forschungs & Entwicklungs GmbH (FHOÖ) - Logistikum Steyr

**Project runtime:** 01/2017 – 03/2021

**Research associates:**

THINKPORT VIENNA

# Smart Urban Logistics Lab – Logistics Hot Spot in the City and for the City

Thinkport Vienna is a mobility laboratory that deals with the challenges of logistics in urban agglomeration areas in a comprehensive and long-term manner, in the special case of Vienna. The mission of Thinkport is to be a catalyst, incubator, and multiplier for new technologies, ideas, and concepts, with the aim of supporting innovations in goods mobility logistics.. The task of Thinkport is to create an open environment for innovations and cocreation. With the resources of the participating institutions, Thinkport Vienna also provides a real-world testing environment for framework conditions, as well as the methodical development and evaluation of complex, innovative concepts, processes, and technologies of smart urban goods mobility. The key guiding principles of Thinkport are freedom from emissions, effectiveness, efficiency, and reclamation of public space. Thinkport Vienna thus helps stimulate innovations and provides support during the implementation phase. It also helps make innovations visible and understandable. The latest trends are displayed locally, and in start-ups space is provided for the development of new business models and technologies. Furthermore, Thinkport makes international networking with other initiatives and innovation laboratiories possible. Logistics service providers, start-ups and technology developers, schools, universities, NGOs, citizens and advocacy groups are addressed.

**Preliminary innovation initiatives are planned in the following areas:**

1. Micro-Urban-Hub: dynamic minilogistics center for local distribution in the inner city, within a 250 to 400 meter radius. Containers with a logistics manager and two distributors, which distribute shipments in the surrounding area without producing emissions.
2. HandWerkZeug ["tools of the trade"]: Supplying workmen and service technicians with replacement parts and materials while taking the public personal transport infrastructure into account. Stationary and moving traffic are also taken into account.
3. Logistics Rodeo (© Adamah): Groups travel with the Thinkport bus and experience live how logistics functions in the city. Active info input is delivered live so that the functions and challenges of everyday operation can be experienced.

Figure: Thinkport Vienna: urban logistics in a new light and at the center of attention. The mobile city labs, which are set up temporarily throughout the entire urban territory, are "knowledge containers". They make technologies and concepts accessible and demonstrate them to diverse interested parties and stakeholders, whose input is then actively gathered.


Figure: The infrastructure of the Port of Vienna, with its lots and buildings, offers a perfect testing grounds or laboratory for virtually all kinds of technology or process innovations. For instance, the Danube corridor in the area of the port is suitable for the testing and use of drones.

*"New resilient solutions for urban logistics must generate as few emissions as possible, be resource conserving, effective and efficient, and designed in collaboration with the users."*

Univ.Prof. Mag. Dr.Manfred Gronalt, Universität für Bodenkultur Wien,
Institut für Produktionswirtschaft und Logistik, Institutsleitung

*"When it comes to questions and concerns about logistics, the lab is THE place to go. The Port of Vienna is the logical logistics partner for Thinkport Vienna, to which it gives its name. The merger of the harbor and Boku creates a wonderful symbiosis, which enables independent access to innovations. The complementary network of all partners permits a comprehensive overall approach and provides all stakeholders with space for new soutions. This setting in combination with the available infrastructures provides a stable foundation for innovations in urban logistics."*

Dir. Mag.ª Doris Pulker-Rohrhofer,
Wiener Hafen, GmbH & Co KG, Geschäftsführerin / Managing Director COO

**Thematic priorities:**

1. Increasing the contribution to emission-free transport in urban areas made by using existing logistics infrastructures or centers.
2. Cooperation and collaboration potentials of mobility of persons and goods for innovative urban logistics concepts.
3. Co-creation & open innovation for technologies, processes, and cooperation models for broadening the impact and increasing the acceptance of alternative approaches.

**Network:**
BOKU Wien, Inst. für Produktionswirtschaft und Logistik, Wiener Hafen GmbH & Co KG, Heavy Pedals, Effizienzcluster Management GmbH, Adamah, iMinds Living Labs, NetPort Science Park AB, Scania Österreich Ges.m.b.H., City of Vienna, City Council - Buiding Affairs and Technology Division (Stadtbaudirektion), StoreMe GmbH, Sustain SA, Australian Living Labs Innovation Network, Australia, WIENER LINIEN GmbH & Co KG, WKW, Transport and Traffic Sector, Zuper GmbH

**Contact:**
Univ.Prof. Mag. Dr. Manfred Gronalt,
Mag. Martin Posset,
Universität für Bodenkultur Wien,
Institut für Produktionswirtschaft und Logistik

**Project runtime:** 04/2017 – 03/2021

**Research associates:**

UML SALZBURG

# Urban mobility laboratory for promoting innovation initiatives in personal mobility and urban logistics in central Salzburg

The purpose of the Urban Mobility Laboratory (UML) Salzburg is to promote innovation initiatives in personal mobility and urban logistics in central Salzburg. The three priorities of the UML as regards content are a) intermodal interfaces (in personal mobility and urban logistics), b) integrated mobility management (location-based) and c) ITS (intelligent transport systems) and alternative power trains. The UML Salzburg is intended to support user-related innovation initiatives and thus convert research findings (including prototypes) into sustainable applications on the one hand, and coordinate and adapt the mobility services with and to the unique challenges of the city and the region.

Figure: Urban mobility laboratory logo

The UML Salzburg aims to initiate new, socially relevant innovation projects, which will make a key contribution toward an intelligent organization of urban personal and city goods mobility and which, also on the basis of the fundamental strategies, have a very high likelihood of being implemented. In addition to the fundamental tasks (e.g., awareness raising, coordination of the master plans), innovative services will be offered which research institutions, planning offices, SMEs, and industry can avail themselves of in order to support their innovation initiatives, wherein (depending on the issue) different stakeholder groups will be included in order to achieve the highest possible degree of networking.

Figure: Bringing traffic data into the car, photo source: Salzburg Research

**Thematic priorities:**
The priorities in terms of content of the UML are a) intermodal interfaces (in personal mobility and urban logistics), b) integrated mobility management (location-based) and c) ITS (intelligent transport systems) and alternative power trains. Services will be offered along with the fundamental tasks (e.g., awareness raising, coordination of the master plans) carried out by the UML. Research institutions, planning offices, and SMEs will be able to avail themselves of these services in order to support and/or give impetus to their innovation initiatives.

**Network:**
The UML is associated with the Salzburg Institute for Regional Planning and Housing (SIR) and consists of a working group with two funding public sector partners (City and Province of Salzburg) and three research partners (Salzburg Research, RSA iSPACE and ZGIS of Salzburg University). It is not only a platform for specialists, service providers, players and stakeholders, but also one for project ideas and planning, specialist know-how and data. It renders non-economic services, in other words ones for which there is no corresponding comparable and available offering on the market. To assure the innovation effectiveness and practical relevance of the UML Salzburg, 40 LOI partners from the different areas (administration, SMEs, advocacy groups, etc.) have already been included.

Preliminary innovation projects are planned in the following areas:
Dynamic data as a basis for solutions in transport and regional planning: Transport- and regional planning-relevant processing, analysis, and depiction of dynamic data via geographical information systems and models for the illustrative development of new solution strategies for solving transport problems (e.g., accessibility matrices, routing services, recommendations for municipalities).
Information services and implementation measures for making transport stops and surrounding infrastructure more attractive:
Development of planning-related information services for evaluating implementation measures to make transport stops and intermodal infrastructure more attractive
Interactive planning tool for bicycle traffic:
Analysis of the bicycle route network in terms of different indicators (safety, slope, distance, etc.) with an interactive, map-based planning tool with a user friendly interface. It will thus be possible to simulate planned measures and determine the shift potential (i.e., the systemic impact) specifically for individual sections.

**Contact:**
Mag. Manuela Brückler
SIR –Salzburger Institut für Raumordnung & Wohnen

**Project runtime:** 01/2017 – 12/2020

**Research associates:**

Figure: Suburban train (S-Bahn) station in Salzburg, Photo source: RSA iSPACE

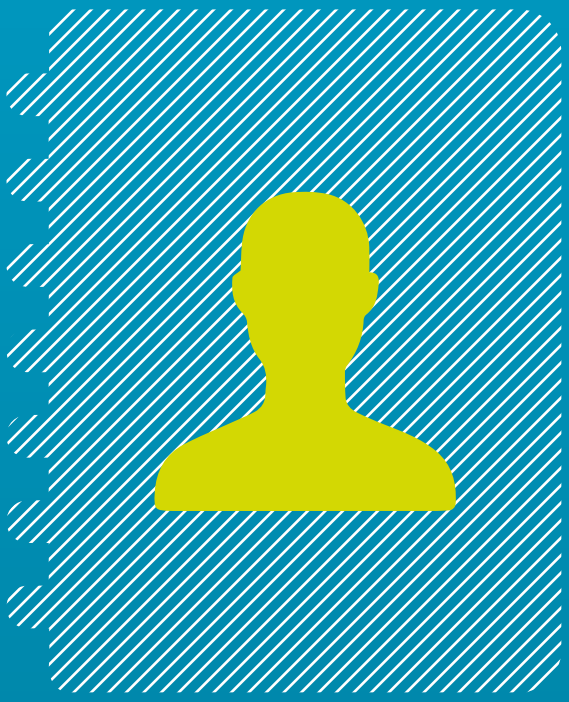
*"The City of Salzburg has set itself the goal of becoming a smart city. In this context, the Urban Mobility Laboratory will create and promote the necessary framework conditions for co-developing smart innovations and technologies for the mobility area. The UML is tapping into the existing knowledge potential in Salzburg and will become a driver for new and future-oriented solution approaches."*

Mag. Josef Reithofer,
Amt für Stadtplanung und Verkehr, Magistrat Salzburg

*"For research and application partners, the UML Salzburg offers versatile innovative services (data services/planning tools/test beds) and networking measures for increasing the visibility and feasibility of projects. It will thus be possible to transfer innovation initiatives (including prototypes) to planning and political practice faster and in a more targeted manner."*

Mag. Dr. Thomas Prinz,
RSA iSPACE, Studioleiter "Smart Settlement Systems"

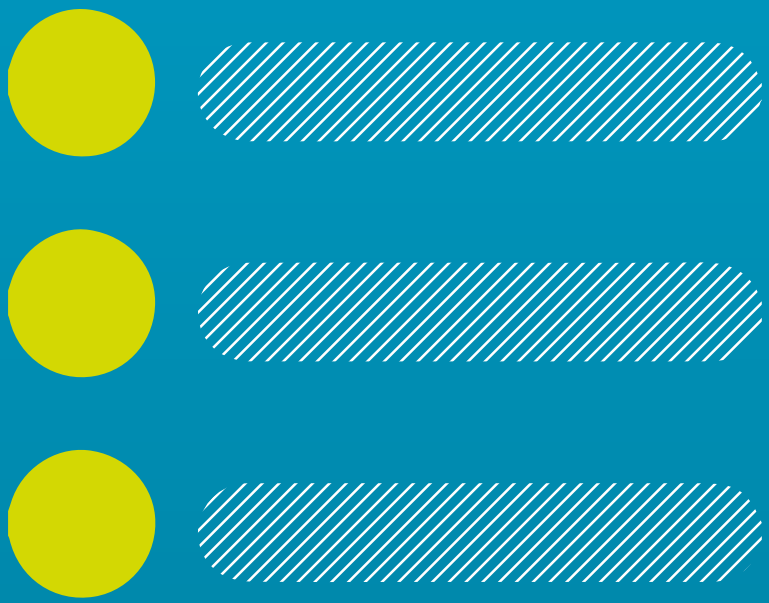
# 9.
# List of Grant Recipients 2012-2016



50plus GmbH
A ABC Consulting
AccessibleMap Association
Agentur Jürgen Liechtenecker
AIT Austrian Institute of Technology GmbH
Akademie für Altersforschung am Haus der Barmherzigkeit
Alpen-Adria Universität Klagenfurt Wien Graz - IFF-Palliative Care und OrganisationsEthik
AMSD Advanced Mechatronic System Development KG
Architekt DI Alfred Ritter
Austrian Players League - Verein zur Förderung von Jugendlichen im IT und EDV Bereich
B Babalas e.U.
BikeCityGuide Apps GmbH
BikeCityGuide Apps. OG
bkm design working group
Blaim & Network Business Consultancy GmbH
Blue Danube Robotics GmbH
B-NK GmbH
BP INTERNATIONAL CONSULTING
BRIMATECH Services GmbH
Bundesanstalt Statistik Österreich
C c.c.com Moser GmbH
Caritas der Erzdiözese Wien, Caritas Bildungszentrum
CARUSO Carsharing eGen
Ceit Alanova gemeinnützige GmbH
Christian Steger-Vonmetz
City Cycling School
Convadis AG
Cows in Jackets
CS Caritas Socialis
CURE - Center for Usability Research and Engineering
D DB Mobility Services Austria, c/o DB Vertrieb
DI Alexander Fürdös
DI Dr.Edeltraud Haselsteiner
DI Gunther Lenz
DI Klaus Heimbuchner
DI Philipp Metzler
Dipl. Ing. Alexander Fürdös
Donau-Universität Krems - Zentrum für angewandte Spieleforschung
Dr. Christopher Schlembach
DS Automation GmbH
E easyMOBIZ mobile IT solutions GmbH
Energieinstitut Vorarlberg
equality
evolaris next level GmbH
Evolit - Consulting GmbH
F Fachhochschule ForschungsGmbH
Fachhochschule St. Pölten ForschungsGmbH
FACTUM Chaloupka & Risser OHG
Factum OHG
FH JOANNEUM Gesellschaft mbH
FH JOANNEUM GmbH
FH OÖ Forschungs & Entwicklungs GmbH
FLUIDTIME Data Services GmbH
Fraunhofer Austria Research GmbH
Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e.V.
G Greiner Pancot 5 Sinne
H Havel & Havel BeratungsGesmbH
heimbuchner consulting GmbH
Heinrich Hoffer
Herry Consult GmbH
Hilfsgemeinschaft der Blinden und Sehschwachen Österreichs
Hofmann
Holding Graz Kommunale Dienstleistungen GmbH
I IBV
IG Fahrrad
IKK Kriebernegg-Kaufmann ZT-GmbH
ilogs mobile softwareGmbH
init
Innovationszentrum für Mobilität und gesellschaftlichen Wandel (InnoZ)
INSEQ DESIGN illera + Partner OG
Institut für Frauen- und Männergesundheit
Institut für Höhere Studien Wien (IHS)
Institut für ökologische Wirtschaftsforschung (IÖW) GmbH, gemeinnützig
INTEGRAL Markt- und Meinungsforschungsges.m.b.H.
Interessensgemeinschaft Fahrrad
is-design GmbH
IT-eXperience Informationstechnologie GmbH
J JOANNEUM RESEARCH Forschungsgesellschaft mbH
Johannes Kepler Universität Linz - Institut für Wirtschaftsinformatik - Software Engineering
K Karl-Franzens-Universität Graz - Wegener Center für Klima und Globalen Wandel
Karl-Franzens-Universität Graz - Zentrum Integriert Studieren
KCW
KMU Forschung AustriaAustrian Institute for SME Research
komobile Gmunden GmbH
komobile w7 GmbH
Kompetenznetzwerk Informationstechnologie zur Förderung der Integration von Menschen mit Behinderung
Kompetenzzentrum - Das virtuelle Fahrzeug,Forschungsgesellschaft mbH
L Landespflegeheim Wiener Neustadt
Langkamp-IT e.U.
Lechner, Reiter & Riesenfelder Sozialforschung OG
Linz - Integriert Studieren
M Magistrat der Stadt Wien - MA 39
MAKAM Research GmbH
matrixx IT-Services GmbH
MC Mobility Consultants
Measury, Verein zur Förderung von Sozialunternehmen
Mediative Soluations
Medizinische Universität Wien - Universitätsklinik für Neurologie
Mentz Datenverarbeitung GmbH
MJ Landschaftsplanung e.U.
MK Landschaftsarchitektur, Ingenieurbüro für Landschaftsplanung und Landschaftsarchitektur
mobimera Fairkehrstechnologien KG
Mopius
N nast consulting ZT GmbH
netwiss
NOUS Wissensmanagement GmbH
O ÖAR
ÖBB Personenverkehr Aktiengesellschaft
ÖBB-Holding AG
ÖBB-Infrastruktur Aktiengesellschaft
ÖBB-Postbus GmbH
Odilien-Verein zur Förderung und Betreuung Sehbehinderter und Blinder Steiermarks
ÖIN - Österreichisches Institut für nachhaltige Entwicklung
ÖIR GmbH
Omnitrend GmbH
one's own
OÖ Verkehrsverbund-Organisations GmbH Nfg. & Co KG
Österr. Blinden- u. Sehbehindertenverband, Landesgruppe Wien, NÖ u. Bgld.
Österreichische Arbeitsgemeinschaft für Rehabilitation
Österreichische Blindenwohlfahrt
Österreichische Post AG
Österreichisches Institut für Wirtschaftsforschung
ostertag architects zt gmbh
Ostertag Architekten

Ötztal Tourismus
Ötztaler Verkehrsgesellschaft m.b.H
ovos media gmbh
ovos media consulting gmbh
P Paris Maderna KG
Philipp Metzler
PL.O.T EDV Planungs- und HandelsgesmbH
PlanSinn Büro für Planung und Kommunikation GmbH
PLANUM Fallast Tischler & Partner GmbH
pn-venture
Polymorph OG
Prisma solutions EDV-Dienstleistungen GmbH
promotion&co
Psychosoziale Zentren GmbH
PTV Austria Planung Transport Verkehr GmbH
R Radfahragentur Wien GmbH
raum&kommunikation GmbH
Research & Data Competence OG
Research Studios Austria Forschungsgesellschaft mbH
Rosinak & Partner ZT GmbH
RTCA - Rail Technology Cluster Austria
S SALK - Gemeinnützige Salzburg Landeskliniken Betriebsgesellschaft mbH
Salzburg Research Forschungsgesellschaft m.b.H.
Salzburger Verkehrsverbund GmbH
Sammer und Partner ZT GmbH (ZIS+P Verkehrsplanung)
Sensor Marktforschung
sew systems gmbh
Siemens AG Österreich
Significance BV
SignTime GmbH
Snizek + Partner Verkehrsplanungs GmbH
Sonja Gruber
Spirit Design - Innovation and Brand GmbH
Strukt GmbH
SynerGIS Informationssysteme GmbH
T TAF mobile GmbH
Talent Dienstleistung und Handel e. Gen.
Talent Dienstleistung und Handes e. Gen.
tbw research GesmbH
Technische Universität Graz - Institut für Fahrzeugsicherheit
Technische Universität Graz - Institut für Geodäsie / Arbeitsgruppe Navigation
Technische Universität Wien - Department für Raumplanung, FB Finanzwissenschaft und Infrastrukturpolitik
Technische Universität Wien - Department für Raumplanung, FB Stadt- und Regionalforschung
Technische Universität Wien - Department Raumplanung, Fachbereich Soziologie
Technische Universität Wien - Institut f. Archichtekturwissenschaften, Abteilung Bauphysik u. Bauökologie
Technische Universität Wien - Institut für Computergraphik und Algorithmen
Technische Universität Wien - Institut für Gestaltungs- und Wirkungsforschung / Zentrum für Angewandte Assistierende Technologien
Technische Universität Wien - Institut für Rechnergestützte Automation
Technische Universität Wien - Institut für Verkehrswissenschaften
Technische Universität Wien - Institut für Verkehrswissenschaften, Forschungsbereich für Eisenbahnwesen, Verkehrswirtschaft und Seilbahnen
TECHNOMA Technology Consulting & Marketing GmbH
TeleConsult Austria
TGW Mechanics
the agent factory GmbH
Tirol Werbung
Tiroler Zukunftsstiftung
Toursprung GmbH
TraffiCon - Traffic Consultants GmbH
TRAFFIX Verkehrsplanung GmbH
TSB Transdanubia Nikolai Ges.m.b.H.
TU Graz - Institut für Straßen- und Verkehrswesen
TU Wien - FB Verkehrssystemplanung | Department für Raumentwicklung, Infrastruktur- und Umweltplanung
TU Wien - Institut für Automatisierungs- und Regelungstechnik (ACIN)
TU Wien - Institut für Konstruktionswissenschaften und Technische Logistik
TU Wien - Institut für Verkehrswissenschaften
TU-Wien, Forschungsbereich für Eisenbahnwesen
TU-Wien, Forschungsbereich für Verkehrsplanung
TU-Wien, Institut für Managementwissenschaften
U UbiGo
UBIMET GmbH
Universität für Bodenkultur - Institut für Verkehrswesen
Universität für Bodenkultur Wien - Department für Raum, Landschaft und Infrastruktur
Universität für Bodenkultur Wien - Institut für Verkehrswesen
Universität Graz - Geographie und Raumforschung
Universität Graz - Institut für Sportwissenschaft
Universität Innsbruck - Institut für Infrastruktur, Arbeitsbereich Intelligente Verkehrssysteme
Universität Linz - Klinik für Neurologie I, Kepler Universitätsklinikum
Universität Salzburg - IFFB Geoinformatik - Division Networks and GI Society
Universität Wien - Institut für Bildungswissenschaft
Universität Wien - Zentrum für Sportwissenschaften und Universitätssport
Universität Zürich - Klinik für Kardiologie
University of Žilina - ERA Chair in Intelligent Transport Systems
V Verein Piramidops
Vereinigung sehbehinderter Menschen
verkehrplus - Prognose, Planung und Strategieberatung GmbH
Verkehrsverbund Ost-Region (VOR) Ges.m.b.H.
Vodev, Mag.Art. MA RCA Valentin
Vorarlberger Auto-Touring Club
Vorarlberger Kraftwerke AG
VU University Amsterdam - Department of Spatial Economics
W Wien 3420 Aspern Development AG
Wiener Hilfswerk
Wiener Linien
Wirtschaftsuniversität Wien - Multilevel Governance & Development
Wirtschaftsuniversität Wien - NPO-Kompetenzzentrum
Wolff, MA Valerie
Wortspiele
WU-Wien - Institut für Transportwirtschaft und Logistik
Z Zemtu

# 10. Research, Technology, and Innovation (RTI) Projects According to Priorities



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| | WOMO | Living & Mobility - Integration of location-based mobility in the planning process | 84 |
| Planning / Modeling / Simulation | ACTIV8! | Efficient Promotion of Active Mobility | 69 |
| | AVISO | Adaptive transport infrastructure optimization through dynamic modification of buildings | 56 |
| | BIKEALYZE | Evaluation of methods for analyzing the interaction of cyclists with their environment | 69 |
| | BioHalt | Natural public transport stop module system | 57 |
| | DeMo | Mobility-related needs of dementia patients, caregivers, and family members | 88 |
| | FACTS4Stops | Development of spatial information services for needs-appropriate connectivity of public transport stops and infrastructure | 58 |
| | FamoS | Bicycle transport models as planning instruments for reorganizing road space | 70 |
| | GOGreen | Impact of greening of urban areas on active mobility | 70 |
| | MatchSim | Multi modal trip chain simulation for individual daily routines | 70 |
| | Mobility Trends | Making use of correlations between searching behavior in internet search engines and mobility-relevant issues | 86 |
| | MobilityEqualizer | Environments of mobility demand for the realization of equalopportunity and needsappropriate mobility options | 59 |
| | MobilityOptimizer | Practical tool for needs-appropriate planning of public transport services based on demand potential and user feedback | 60 |
| | MULTIMOTIV | MULTIMODALITY TOOL FOR RURAL AREAS | 70 |
| | Partizipationstool 2 | Optimization of e-participation in infrastructure projects for overcoming process-induced barriers | 61 |
| | PlanBiss | Site planning for bike sharing systems, with demand, redistribution, and maintenance taken into account | 70 |
| | PROVAMO | Prototypes for a valid and automatic mobility survey with mobile terminal devices | 62 |
| | ROPEWAY_POT | Potential of an urban cableway inmultimodal urban transport | 63 |
| | SHIQUE | Sensor technology in cell phones for infrastructure quality and user experience | 87 |
| | SIMMARC | Safety IMprovement Using Near Miss Analysis on Road Crossings | 71 |
| | SOMOBIL | Improvement of public transport service on a mobility-oriented basis | 64 |
| | ULTIMO | Identification of multimodal lifestyles with innovative survey technologies | 71 |
| | VOR-Rider | Social media communication as a basis for a needs-oriented and effective planning of student traffic | 65 |
| | VR-Planning | Virtual reality for participative planning and evaluation of needs-appropriate and active mobility environments | 71 |

| Topic | Short title | Full title | Page |
|---|---|---|---|
|  Fundamental mobility and transport research | AEIOU | Application possibilities, experiences, added value generation, and indicator formation on the basis of Österreich Unterwegs | 100 |
| | AEIÖU | Exploiting the explanatory content in Österreich Unterwegs | 100 |
| | COSTS | Affordable mobility: Determinants, effects, developments - elaboration and evaluation of innovative strategic options | 92 |
| | DISCOVER | Demonstration of an optimum use and technology-supported expansion of Österreich Unterwegs in transport planning | 100 |
| | Input-ÖU | Added value through innovative imputation and weighting to supplement unreported avenues for Österreich Unterwegs | 100 |
| | KoStrat-AktiL | Coordinated RTI strategies for mobility and life quality in the context of demographic change | 91 |
| | OPERMO | Operationalization of multimodality in personal transport in Austria | 94 |
| | Querdenkenquerdenken | Companion study for further developing the "Personenmobilität quer denken" [Personal mobility: thinking outside the box] pilot initiative | 95 |
| | REBOUND | Dynamics and prevention of rebound effects with mobility innovations | 100 |
| | RELAUT | Unreliable travel times in Austria: Quantity, costs, and impact | 96 |
| | SAMOA | Sustainability Assessment for Mobility in Austria | 100 |
| | ShareWay | Ways of further developing shared mobility to the third generation | 98 |
| | WIFAS | Model for assessing social impacts for the mobility of persons and goods | 99 |
|  Urban Mobility Laboratories | aspern.mobil LAB | The aspern.mobil LAB urban mobility laboratory | 111 |
| | Graz grenzenlos | Graz grenzenlos Urban Mobility laboratory | 112 |
| | MobiLab OÖ | Mobility Laboratory Central Upper Austria | 114 |
| | Thinkport Vienna | Thinkport Vienna - Smart Urban Logistics Lab | 116 |
| | UML SALZBURG | Urban mobility laboratory for promoting innovation initiatives in personal mobility and urban logistics in central Salzburg | 118 |