IVe
Institut für Verkehrswesen

DAVeMoS

BMK Endowed Research Group for Digitalisation and Automation in the Transport and Mobility System

Newsletter

Newsletter Vol. 01/2022

DAVeMoS is an Austrian Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology (*Bundesministerium für Klimaschutz, Umwelt, Energie, Mobilität, Innovation und Technologie*, BMK)'s Endowed Research Group with a mission to strengthen the competitiveness and knowledge building in the field of digitalisation and automation in the transport and mobility system at local, regional, national, and the EU levels.

Read more about DAVeMoS at:
www.davemos.online

Head of the group:
Univ. Prof. Dr. Yusak Susilo
yusak.susilo@boku.ac.at

Hosted by BOKU Institute for Transport Studies: www.boku.ac.at/en/rali/verkehr

Picture credit: Roman Klementschitz

1. Multidimensional integration of mobility hubs

The concept of mobility hubs has been researched and implemented by many countries around the world for decades. For example, one may have familiarized with the 'transit-oriented development' concept, which promotes a symbiotic relationship between dense, diverse, compact urban form and public transport use. Over time, with the (re-)emerging of more physically active mobility modes, the planning practices are more focusing on physical multimodal transfer facilities, which initiated the rise of a smaller, but more agile and adaptable mobility hubs. In Europe, there is a large diversification of what is understood by the term mobility hub (or mobility station, mobility point), leading to a variety of definitions in the literature. What they have in common, however, is the core idea behind mobility hubs, which is the spatial connection of multiple mobility modes including shared mobility, offering a physical location for users to switch between modes.

To facilitate planning processes, in the past, a categorization of mobility hub based on location and functions was relatively common. Whilst it is true that the physical integration – the physical connection of multiple mobility modes including shared mobility – is essential to provide a physical location for users to switch between modes, the mobility hub concept also relates to digital integration as a hub involves app-based forms of mobility. Digital integration describes how well information from various mobility offers are integrated into a single digital platform. Thirdly, for an innovation to be adopted and embraced by the society, it is important to be inclusive and cater for the needs of a wide variety of different users. To have this democratic/societal integration, we should move from 'public participation' to 'co-creation' process, and avoid being limited only on a 'the more, the better' logic.

(...)

To make this integration concept operational, a multidimensional topological approach for mobility hubs has been introduced in the ERANET project *SmartHubs*. The Smart-Hubs integration ladder is based on three dimensions: the physical, digital and democratic integration dimensions. Each dimension has 5 levels. Furthermore, universal design principles (according to Story 2001) are embedded as a common threshold to enhance broader usability and accessibility. This universal design, considering not only physical but digital and democratic (participatory) integration as well, is frequently missing in mobility hub concepts and definitions found in literature or planning practice.

Further information on this can be found in: https://www.smartmobilityhubs.eu/data

Yusak Susilo

Reference:

Story, M. F. (2001). *Universal design handbook* (2nd ed.)

Table 1. SmartHubs integration ladder (source: SmartHubs Deliverable 2.2: www.smartmobilityhubs.eu/data; edited)

	Physical integration	Digital integration	Democratic integration
Level 4	**Conflict-free and place-making** • At least two shared transport modes visible from a public transport stop • At least two additional services (e.g., shop, parcel locker, kiosk) • Barrier-free accessibility and information about services provided • Attractive design of mobility hub, branding and aesthetically pleasing • Universal design principles are considered	**Integration of societal goals, policies and incentives** • Local, regional, and/or national policies and societal goals are integrated into the service • Universal design principles are considered, including simple and intuitive app design and low-tech or analogue booking alternatives	**Social learning** • Interconnectedness and societal integration of participants, including vulnerable groups, and providers • Participation becomes permanent and independent
Level 3	**Visibility and branding** • At least two shared transport modes visible from a public transport stop • At least one additional service (e.g., shop, parcel locker, kiosk) • Information about services and potential access barriers • Attractive design of the mobility hub, branding and aesthetically pleasing scheme • Universal design principles are considered	**Integration of service offers** • Shared and public transport services at the hub are bundled, possibly subscription-based • Universal design principles are considered, including simple and intuitive app design and low-tech or analogue booking alternatives	**Integration of different knowledge** • Participants, including vulnerable users, argue or deny positions • Their input is integrated into the participation process • Participation creates room for decision-making
Level 2	**Wayfinding and universal design** • At least two shared transport modes in acceptable walking distance to public transport with wayfinding and information about services • At least one additional service (e.g., parcel locker, kiosk) in acceptable walking distance • Universal design principles are considered	**Integration of booking and payment and universal design** • Easy access to services for end users – such as a mobility marketplace or a one-stop shop where the user can find, book, and pay with the same app • Universal design principles are considered, including simple and intuitive app design and low-tech or analogue booking alternatives	**Deliberative engagement of stakeholders** • Participants, including vulnerable users, argumentatively engage in decision-making, exchange of positions, active participation • Providers invite participation and listen to stakeholder interests, including those of vulnerable user groups
Level 1	**Acceptable walking distance to shared and public transport** • At least two shared transport modes in acceptable walking distance to public transport • At least one additional service (e.g., shop, parcel locker, kiosk) in acceptable walking distance • Minimum legal inclusive design requirements are considered	**Integration of information** • Multimodal travel planners available to plan the use of mobility offers at hubs • Minimum inclusive design requirements are considered such as simple and intuitive app design	**Appropriate representation of stakeholder interests** • Participants got asked into a consultation process, information is recognized • No or limited attention to involve vulnerable user groups
Level 0	**No physical integration** • One shared transport mode, not in walking distance to public transport, without integration between the modes • No universal design criteria are considered	**No digital integration** • Separate services and digital platforms for each mode • No universal design criteria considered	**No involvement** • Lack of involvement or consideration of stakeholder interests and user needs

2. Cognitive load research with DAVeMoS Virtual Reality Lab

Cognitive load is an important concept for understanding driving and riding performance which impairs driving or riding tasks that demand cognitive control (Engström, 2017). The measurement of cognitive load has been extensively studied in recent years, however, it still faces many challenges, especially the lack of methods in measuring under controlled experiments.

In order to fill the gap, the DAVeMoS team conducted this experimental research with the virtual reality (VR) lab, which enabled simulation and tests in different dynamic scenarios with great control of background variables (Farooq et al., 2018, Armougum et al, 2019). The aim was to develop a measurement method capable of collecting physiological data that could reveal changes in subjects' cognitive load, as reflected through the electrical activity of the brain recorded with electroencephalogram in VR, as well as in real life. Additionally, in terms of the practical implications, current research aims to contribute to a better understanding of the complexity of tasks, behaviour and cognitive load of micro-mobility users which can feed into safety research.

Experiment design and data

The experimental design encompassed virtual reality simulation and real-life setup with three scenarios of varying difficulty, including indoor and outdoor scenarios in BOKU campus (see figures 1 and 2) and a public space scenario of Schottenring in Vienna city (figure 3). The VR scenarios replicated the real-life environments which enabled the validation of the result obtained in VR and draw conclusions about its applicability as a research tool. Moreover, the participants rated their subjective cognitive load after each task on a standardised PaaS scale (Sweller, 2018) that served as a complementary measure of the cognitive load. Collection of these different data types allowed for their cross-validation and the assessment of relative performance in dynamic experiments.

Along the performed tasks, the subjects had their brainwaves data collected with the mobile EEG device Enobio 8, Heart Rate (HR) data with the ECG Polar chest strap and skin conductivity data measured with E4 wristband. An example of raw brainwaves data and skin-conductance data can be seen in figure 4. Participants' behaviour has been recorded by the customised e-scooter which served as an input device in both VR and real-life setups.

Figure 1. Test in BOKU indoor scenario of real-life setup

Figure 2. Test in BOKU outdoor scenario of real-life setup

Figure 3. Test in Schottenring scenario of VR setup

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Sample information

The experiment was conducted from 10th February to 18th March 2022 using a two-wave data collection process. The sample of 35 participants consisted of 11 women and 24 men. The majority of them were university students between the ages of 19 and 34. A share of 23 % used an e-scooter at least once a week and considered themselves as active e-scooter riders, while 9% owned private e-scooters (more demographic information can be seen in figure 5). Most participants had real-life experiences of car driving, bike and e-scooter riding, however, very few of them had ever used a traffic simulator in a VR environment. Data processing is still in progress.

Next steps

The richness, variety and volume of the data collected in the experiment open the opportunity for several different analytical approaches in a number of research directions. This includes, for instance, temporal mapping of HR variability and brainwave data on behaviour in different tasks and environments, comparison of the impact of experimental setup on the riding performance or evaluation of the coherence between different data types. At the same time, the effort to understand the data and ensure its accuracy and validity is much higher. The expected results will also provide some practical guidance for the design of VR studies in the future and could also shed some light on the level of behavioural and physiological congruence of VR studies that provides implications for the generalisability of findings and level of confidence in the results. This is important not only for scientists, who are concerned with the enhancement of experimental designs to collect more reliable data, but indirectly for policymakers where elaborated data collection methods will give basis for more informed decision-making.

Shun Su and Martyna Bogacz

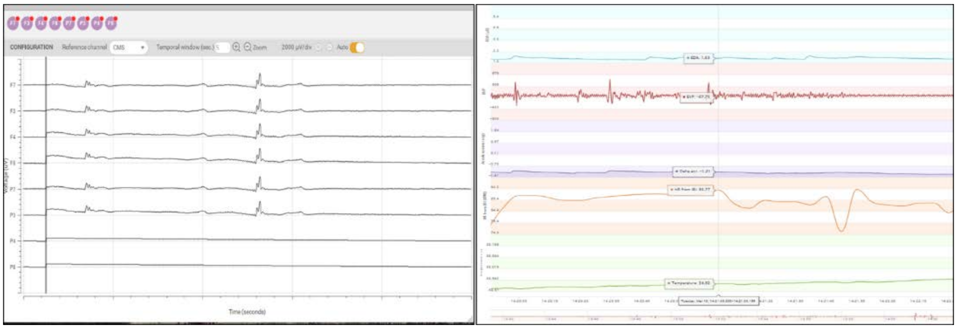

Figure 4. Sample data of EEG, Heart rate and EDA of participant 18 (encounter pedestrian of Schottenring Scenario in VR setup)

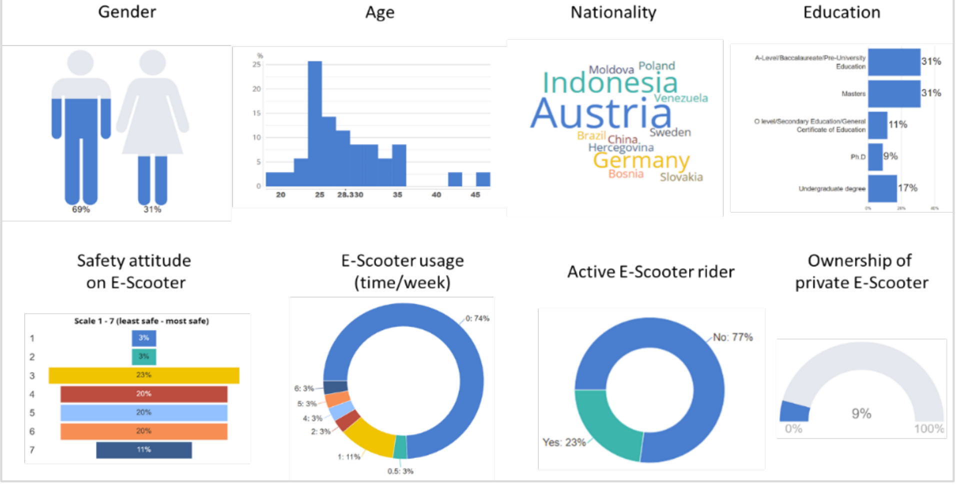

Figure 5. Summary of information on participants

References:

1. Armougum, A., Orriols, E., Gaston-Bellegarde, A., Joie-La Marle, C., & Piolino, P. (2019). *Virtual reality: A new method to investigate cognitive load during navigation.* Journal of Environmental Psychology, 65, 101338.

2. Farooq, B., Cherchi, E., & Sobhani, A. (2018). *Virtual immersive reality for stated preference travel behavior experiments: A case study of autonomous vehicles on urban roads.* Transportation research record, 2672(50), 35-45.

3. Sweller, J. (2018). *Measuring cognitive load.* Perspectives on medical education, 7(1), 1-2.

4. Engström J, Markkula G, Victor T, Merat N. (2017). *Effects of Cognitive Load on Driving Performance: The Cognitive Control Hypothesis.* Human Factors. 2017; 59(5):734-764. doi:10.1177/0018720817690639

3. Lessons from deploying a 7-days smartphone-based activity diary survey in an Asian Megacity

Using a mobile phone to collect a large-scale household travel survey has been an interest of practitioners and research community for two decades. Whilst the evidences so far are concentrated in developed countries, a DAVeMoS team member has been working with a couple of Japanese international companies to deploy a large-scale 7-days household's Activity-Diary Survey (ADS) in Jakarta Metropolitan Area (Jabodetabek), Indonesia.

The ADS was conducted in two ways: using smartphone application (ADS MEILI) and using paper-based (ADS PAPI). First, MEILI, an open-source smartphone application for mobility data collection, had been successfully experimented with in Stockholm and Gothenburg, Sweden between 2014 and 2017. Thus, it was adopted and further developed for ADS in Jabodetabek. Adjustments to the study area include: (a) points of interest (POI), (b) base map, transit lines, and (open-source) road network, and (c) type of transport mode and its characteristic (i.e. speed, acceleration, fare, etc.). Thus, ADS MEILI targeted collection of trips of 35,000 person-days by asking 5,000 respondents from 5,000 different households. Respondents were asked to install MEILI in their own smartphones and carry the phones for seven consecutive survey days. Second, ADS PAPI was also conducted for comparison and complementary purposes. ADS PAPI targeted 5,000 respondents from 5,000 households, as well. ADS PAPI was also prepared for respondents who did not possess smartphones. Collected data from both methods of ADS mainly consists of socioeconomic data of households and activity-travel data of individuals.

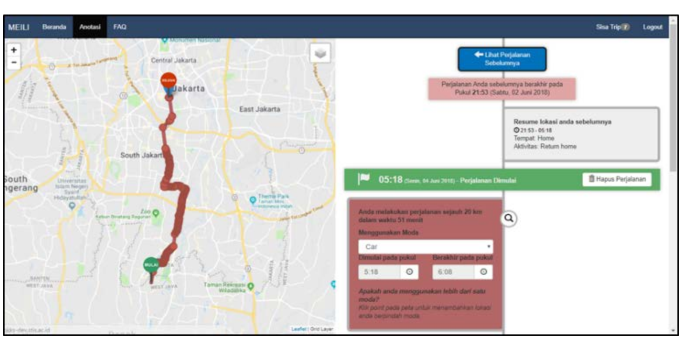

Figure 1. Web-based annotation for respondent's activity-travel diary (source: Yagi et al., 2022)

During the seven days of survey period, ADS MEILI recorded respondents' coordinate data of latitude, longitude, and accelerometer records. On the other hand ADS PAPI was rather straightforward with filing-in of survey forms. The records of origin, destination, mode transfer location, and other attributes were collected and the trip length and duration were also calculated. Items to be confirmed by the respondents through annotation included type of modes used, fare spent, and main purposes/activities of the trips. The implementation of ADS MEILI was faced by several challenges, namely: (1) firmware of certain types of Android phones that automatically forces application shutdown even hampered the installation for saving battery consumption; (2) excessive GPS/GNSS points record that drains the battery; (3) GPS/GNSS accuracy disruption for specific types of area such as high-rise buildings, highways, and inside the rail-based public transportation. Challenges were also encountered in obtaining the respondents, namely: (1) the tendency to reject the survey introduction by phone call; (2) various ability and accessibility to the use of online forms/digital platform. Moreover, to annotate trips, MEILI Jabodetabek interface was considered too complicated for some respondents. Therefore, in-depth assistance from the call center was provided to guide the respondent through the steps for both socioeconomic data collection and trips annotation.

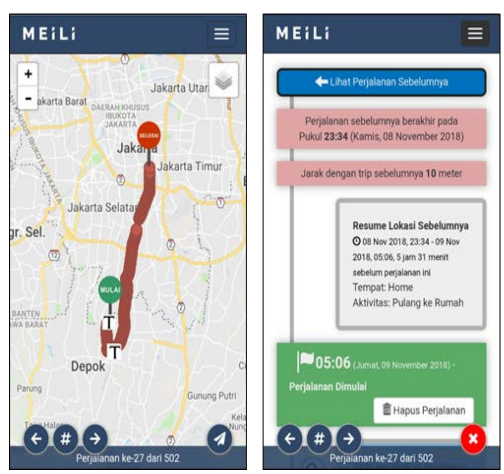

Figure 2. Phone/application-based annotation for respondent's activity-travel diary (Yagi et al., 2022)

Average gross trip rate of ADS with MEILI was 2.8, which was significantly higher than that of ADS with PAPI, namely, 1.9. This implies that ADS with MEILI collected all trips, while ADS with PAPI might have missed some. Since resolution of ADS with MEILI results was much higher than ADS with PAPI in terms of coordinates, time and acceleration, it enables various analysis such as transit location and routes. By reviewing the findings and challenges in the survey, opportunities for the application development are still needed for the improvement of the survey implementation, such as function to avoid forced closure, attractive and user-friendly interface, improvement of GPS/GNSS accuracy recording performance, advanced machine-learning system to reduce respondents' burden for annotation, as well as other supporting steps, namely provision of attractive incentives, extensive public relations from the survey organizer and also governmental support in disseminating survey activities. With comprehensive travel data that can be acquired from ADS with utilization of smartphone application, it is considered a promising tool to be utilized for conducting travel surveys, particularly for developing a travel demand forecast model.

Yusak Susilo

Full paper was presented at the 12th International Conference on Transport Survey Methods: Travel Survey and Big Data, Porto, 2022.

Reference:

Yagi, S., Nobel, D., Kawaguchi, H., Kimberly, A. and Susilo, Y.O. (2022). *Application of the Smartphone-based Mobility Collector in Developing Countries - comparison with a conventional activity diary survey.*

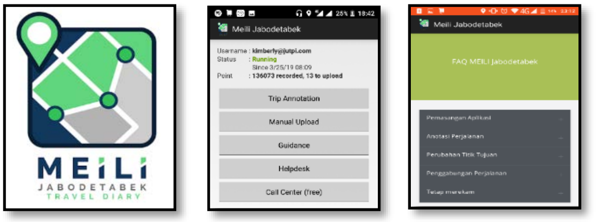

Figure 3. MEILI Jabodetabek Icon and Application Manual.

4. Update on agent-based simulation development with MATSim for Austria's eastern region

The DAVeMoS modelling group is working on an agent/activity-based model and simulation for Austria's eastern region (Vienna, Lower Austria and Burgenland). As the major data base, we use an up-and-running conventional 4-step-model, provided by our partner ITS Vienna Region. Out of this, we extracted the needed data, notably the initial demand in the form of origin-destination-matrices per mode, network data per mode and comprehensive public transport data (schedule, lines, stops and vehicles). The basic idea of this framework is to use ABM as an add-on for a conventional 4-step-model, i.e. supplementing instead of replacing it.

Travel demand is further specified by assigning attributes to our synthetic population's individuals, the agents. Origin and destination data are based on traffic cells, which commonly correspond to smaller municipalities, town quarters or city neighborhoods. The temporal distribution of the trips is done with additional data from the Austrian national travel survey *Österreich unterwegs* (Tomschy et al., 2016), using suitable matching approaches.

Activity locations are spatially allocated based on the given trip purposes. In a first step, we created a pool of potential activity locations, based on building information from OpenStreetMap. For the simulation itself, currently, the four main modes car, public transport, walk and bike are used. Mode parameters are derived from the AIT open model (Müller et al. 2021) at this stage. All modes except for walking are actually routed and simulated on their respective network, gaining necessary information for detailed further analyses. In the next development step, for the establishment of mobility hubs, also shared modes like car, e-scooter and (e-)bikes will be implemented, as well as demand-responsive transport (DRT).

Martin Hinteregger

References:

1. Müller et al. (2021). *MATSim Model Vienna: Analyzing the Socioeconomic Impacts for Different Fleet Sizes and Pricing Schemes of Shared Autonomous Electric Vehicles.* URL https://www.researchgate.net/publication/349212535
2. Tomschy et al. (2016). *Österreich unterwegs 2013/2014.* URL https://www.bmk.gv.at/dam/jcr:fbe20298-a4cf-46d9-bbee-01ad771a7fda/oeu_2013-2014_Ergebnisbericht.pdf

5. Last mile trips during COVID pandemic

The DAVeMoS team was commissioned by the East Tyrol Regional Management as an external expert group for the Interreg project Last Mile COVID-19. The aim of the project is to analyze the impact of the COVID-19 pandemic on mobility in the region. Based on the impact analysis on mobility behavior and daily activities, an action plan will be developed on how to overcome the negative impacts and strengthen sustainable mobility after COVID. Important findings in this regard were provided by the Mobility-Activity-Expenditure Diary (MAED), an Austria-wide mobility, time budget and consumption survey developed by the Institute for Transport Studies and supported by DAVeMoS. For the pandemic impact analysis, those participants who live in rural and peripheral regions in southern and western Austria were evaluated.

Due to the decreased number of trips per person per day, less time was spent on mobility. While 4.8% of the daily time budget was spent on mobility in the fall of 2019, this share dropped to 2.8% in 2020 due to the first lockdown. The closure of leisure facilities and the majority of stores and service facilities, the cancellation of events, the reduction of working hours or the loss of a job led to a significant shift in the use of time. This is reflected in a decrease in the "work" share from 12.8% to 11.7%. The situation is similar for personal activities. The time budget thus gained led to an increase in the share of leisure activities from 22.6% to 26% and household activities from 51.7% to 53.4%. Many activities had to be shifted to home. The percentage of the population that has the opportunity to use home office is striking. In fall 2019, almost all work activities were performed away from home. This has changed significantly during the lockdown. Aside from the decrease in total hours, more than 40% of work time was spent at home (figure 1).

Furthermore, for the analysis of the change in mobility demand in East Tyrol, data from public transport and car sharing providers were made available or counting points were evaluated (conventional and demand-oriented public transport, carsharing and private car). A comparison of mobility demand was performed for three different months: April 2019 (before the pandemic), April 2020 (the first and very strict lockdown, including the closure of schools and the requirement to leave home only in very urgent cases), and April 2021 (a mix of restrictions to leave home and the closure of tourist as well as gastronomic establishments and shops except food and daily needs). While at the beginning of the pandemic (spring 2020) the impact in the region was enormous. Mobility demand recovered from the pandemic, but at a lower level than before. Only conventional public transport and carsharing showed stable or even positive development when comparing 2019 and 2021, while on-demand transport providers (micro-public transport) are still struggling with lower demand (figure 2).

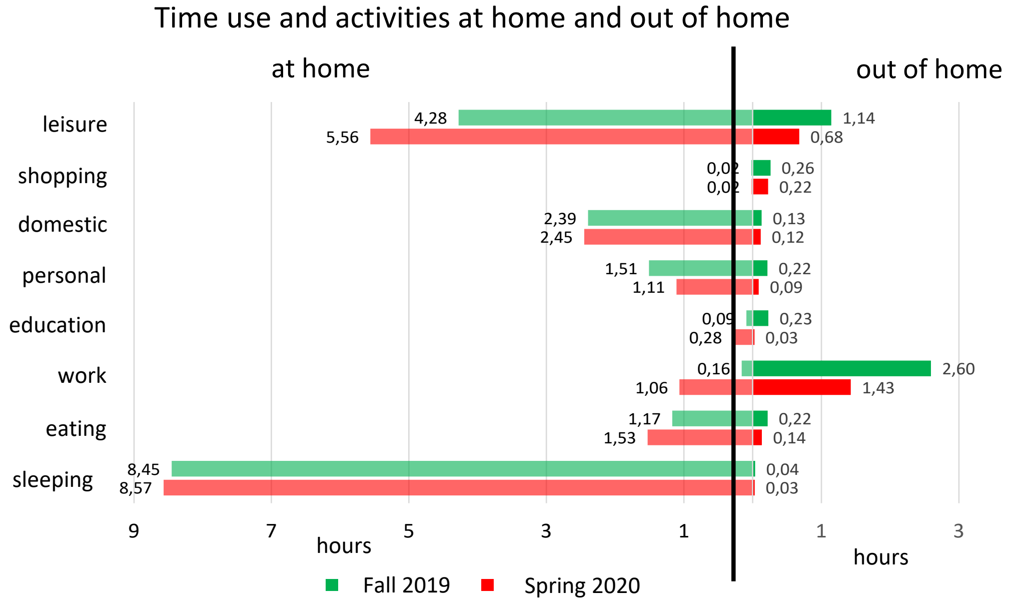

Figure 1. Change in hours spent per activity per day in rural and peripheral areas in western and southern Austria, all weekdays.

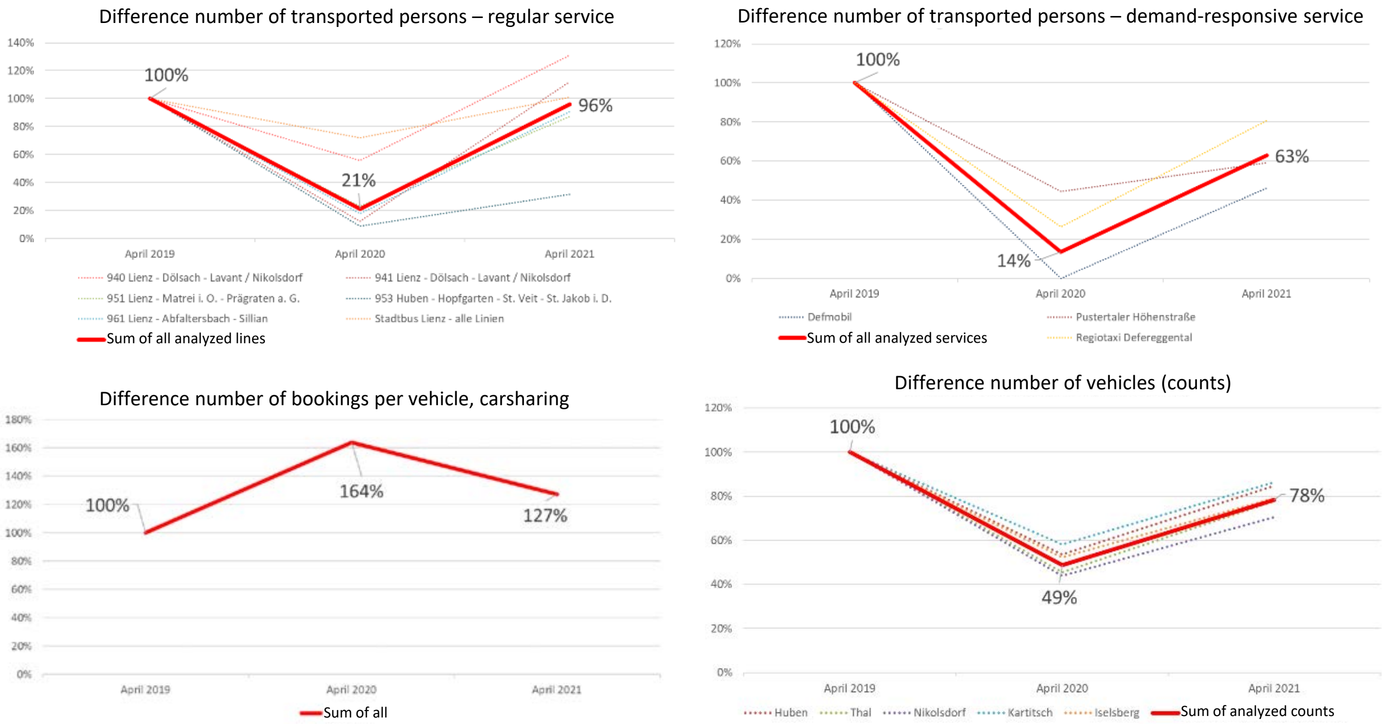

Figure 2. Change in traffic demand of different traffic modes due to COVID-19 pandemic (reference month April 2019).

Roman Klementschitz
Oliver Roider
Reinhard Hössinger

6. What happened to our travel time budget (TTB) during the COVID-19 pandemic?

Based on a series of time-use diaries of approx. 500 Austrian respondents (https://ive.boku.ac.at/covid), we examined the impacts of and the behavioural change due to COVID-19 restrictions on the limits and distributions of ones' travel time budget over time (figure 1). Each phase of restriction was represented by a separate wave of a mobility activity survey collected in Austria: before the pandemic (wave 1, 18.09.2019 - 09.03.2020), during the 1st, hard lockdown (wave 2, 16.03.2020 - 08.08.2020), and the recovery phase in the 2nd year of pandemic (wave 3, 15.03.2021-20.12.2021). The total number of respondents is 1,505, while the number of respondents before COVID-19 (wave 1) is 440, and the number of respondents in the first year of the pandemic (wave 2) is 465. Wave 3 (second year of pandemic) consists of 600 respondents, of whom 300 respondents participated in wave 1 and 300 in wave 2.

The preliminary results, using a stochastic frontier model, found that females have lower travel time budgets than males, but females had higher travel time budgets during the pandemic. It shows that intra-household interactions led to the re-sharing of domestic activities across household members. On the one hand, travel time budgets on the weekend were lower than on workdays before COVID-19 but the travel time budget on Thursday is the highest during COVID-19. On the other hand, on weekends, virtual travel time budgets are higher during and before the pandemic, which indicates that the persons have more time to do online activities.

Anugrah Ilahi
Reinhard Hössinger
Yusak Susilo

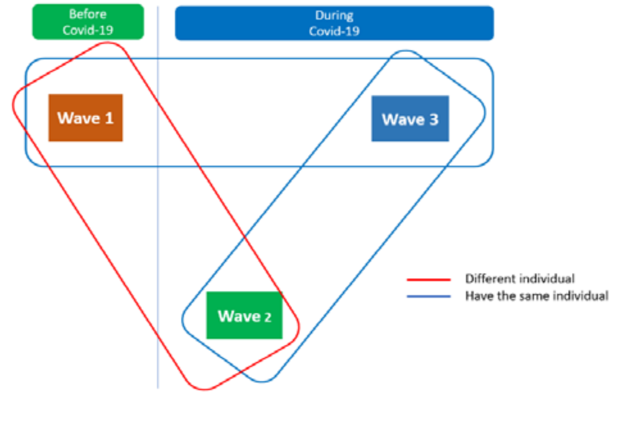

Figure 1. Model development of three-waves survey

7. New research team members

ALEXANDER ROSSOLOV, B.Sc., M.Sc., PhD., MBA, D.Sc., is a our newest Research Scientist at DAVeMoS. Prior to joining DAVeMoS, he was an Associate Professor at the Transport Systems and Logistics Department, at the O.M. Beketov National University of Urban Economy in Kharkiv, Ukraine. With DAVeMoS, beside supporting the existing on-going work, he will strengthen the team on discreate choice modelling, B2C logistics, e-commerce, and sustainable last-mile deliveries related research initiative.

MUHAMAD RIZKI (Taki), B.Eng., M.Eng., is an Ernst Mach Grant ASEA-UNINET Scholarship holder for doctoral study at the Institute for Transport Studies, BOKU. His main research interests are digitalization, travel behavior, environment, and subjective well-being.
His doctoral dissertation is focused on understanding the evolution of individuals' decision mechanisms towards the use of Super-Apps in Indonesia. The research will also explore the wider impact of their use to travel behavior, environment, and economy.

8. The impact of rural road characteristics to the energy consumption of an automated bus operation (completed Master's thesis by Sophie Wegscheider):

Utilising data collected from the Digibus project, an automated electric shuttle service deployed in the town Koppl, this Master's thesis examined the energy consumption of an automated bus service in a peripheral terrain with up to 8 % slope. A digital elevation model was calculated and a panel regression analysis was employed to explore the impact of rural road characteristics on the vehicle's energy consumption. The results confirm a correlation between energy consumption and road gradient and indicate that steep uphill slopes cause a significantly higher energy consumption than flat terrains. However, they also illustrate how significantly less energy is spent on downhill slopes compared to flat terrains. The energy consumption of the AEV was also evaluated against traditional internal combustion engines of comparable size and was found to perform more energy-efficient in all tested scenarios. The complete version of the thesis can be found here: https://abstracts.boku.ac.at/download.php?dataset_id=23039&property_id=107

9. FSV Planning Seminar 2022 "New mobility - new questions - new models"

The FSV Planning Seminar, organized by the Austrian Research Association for Roads, Railways and Transport (FSV) in cooperation with DAVeMoS and the Institute of Transport, is dedicated to the topic of transport models this year. These models should represent the traffic system in the best possible and most comprehensive way, but also be able to show the consequences of interventions or developments. In this way, they create a basis for foresighted planning and steering of the transport system in a desired direction. In recent decades, however, it can be observed that the transport system is becoming more complex, new forms of mobility have emerged, but also new lifestyles and new management strategies for the transport system. Transport models must be able to take these developments into account in order to be fit for the future. Technological progress is also opening up new possibilities for traffic models. More powerful computing machines, more accurate and more comprehensive information and data enable further developments in this field. This can be done by refining or improving existing models, but also by completely new approaches to modeling the transportation system. Based on this, we would like to discuss the consequences, possibilities and limits of the application in daily practice with the participants in this year's seminar. The FSV planning seminar will take place on May 5th and 6th, 2022 in Waidhofen an der Ybbs, province of Lower Austria. The detailed program can be found here:
https://de.davemos.online/_files/ugd/8db924_2228d27349ee4f9e81fc30e211f07757.pdf

Roman Klementschitz

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Wirtschaftsforum Waldviertel

10. Final conference of Interreg project SMACKER

This conference on soft measures for improved information and behavior change in the mobility sector in rural regions takes place in Vienna on May 24th, 2022, 9 am to 4 pm.

An interesting project, in which colleagues from the DAVeMoS team also participated and there was an intensive exchange of experiences with DAVeMoS activities, is coming to an end. The SMACKER project focused on the promotion of demand responsive public transport and other flexible mobility offers (micro public transport services), the connection of regional mobility systems to the main EU corridors and transport nodes (last mile) and in general on an increased use of public transport. We look forward to seeing you there! The event in English will take place in a hybrid way at the BOKU Vienna as well as online. More information, the program and the registration form can be found here:

http://short.boku.ac.at/SMACKER-Final-Conference

Roman Klementschitz

11. Gunnar Flötteröd is Guest Professor at the Institute for Transport Studies

Dr. Gunnar Flötteröd has been appointed as Guest Professor at the Institute for Transport Studies of BOKU Vienna.

Professor Flötteröd is Adjunct Associate Professor at the Linköping University, Sweden, and Senior Researcher at the Swedish National Road and Transport Institute (VTI). He is one of the world's leading experts in transport simulation and modelling, in particular on agent-based simulation and dynamic traffic assignment.

During his visit Prof. Flötteröd is contributing to collaborative research and teaching the 856.049 course "Traffic and Transport Planning - selected topics (in Eng.)" with the focus: "A primer on person transport modelling and simulation".

Professor Flötteröd will also provide a scientific lecture (in English) on:

"Persistent challenges in integrated travel behavior/network modeling"

On: Tuesday, 31st of May, 13:00 – 15:00
At: Universität für Bodenkultur
1190 Wien, Peter-Jordan-Strasse 82
Ilse-Wallentin-Haus, SR29/2 and online

Further information of the content of the lecture can be found in here:
https://www.davemos.online/_files/ugd/8db924_10e1600d5241453da3bde079abcca90c.pdf

For registration, please contact:
davemos.admin@boku.ac.at

Yusak Susilo

12. List of DAVeMoS activities (12/21 – 04/22)

In Management:

1. Since November 2021, DAVeMoS team has further grown with 1 Guest Professor: Professor Gunnar Flötteröd, 1 Research Fellow: DDr Alexander Rossolov, and 1 EMG OeAD scholarship student: Mr. Muhamad Rizki. During the same period, DAVeMoS also hosted 2 visiting post-graduate students, Mr. Marco Ferro from Bologna University and also Mr. Robin Palmberg from KTH Royal Institute of Technology, as a part of DAVeMoS' research exchange initiatives. Both now have finished their 2-3 months visiting period and returned to their home institutions.

In Research:

1. In the last five months, DAVeMoS team has published 5 web-of-science publications, 5 peer-reviewed conference articles, 1 interview with a major newspaper and 1 invited lecture for a local organization in Vienna.
2. DAVeMoS participated in a 2-days B2B activity which was organized as a part of Austrian Technology Days – South East Asia 2022.
3. During this reporting period, DAVeMoS has been deploying the 2nd wave of its demand-responsive transport survey in Salzburg and also deployed its first series of Virtual Reality experiments.

In Education:

1. In this early spring period, DAVeMoS has started one new course on the principles of agent-based simulation as one of elective transport engineering and planning courses. DAVeMoS also co-led the seminar course of BOKU's T2S Doctoral School.
2. One BOKU Master's thesis which focused on the real-life evaluation of energy consumption of automated bus operation in rural areas has been completed with a distinction outcome.
3. During winter and spring period, DAVeMoS hosted two visiting students from Italy and Sweden. Marco Ferro, from Bologna University, has spent 3 months with DAVeMoS team as an Erasmus Trainee period. During this period Marco was involved in the SmartHubs project. Robin Palmberg from KTH Stockholm has spent about 1.5 months with DAVeMoS team to develop his Virtual Reality experiments.

13. List of DAVeMoS publications (12/21 – 04/22)

Peer-reviewed journal:

1. Guo, J., Susilo, Y.O., Antoniou, C. and Pernestål, A. (2022) Word of mouth and behavioural intentions of the automated bus service. *Cities*, 126, 103668, doi: 10.1016/j.cities.2022.103668
2. Koch, S., Khomenko, S., Cirach, M., et al. (2022) Impacts of changes in environmental exposures and health behaviours due to the COVID-19 pandemic on cardiovascular and mental health: A comparison of Barcelona, Vienna, and Stockholm. *Environment Pollution*, doi: 10.1016/j.envpol.2022.119124
3. Alhassan, I.B., Matthews, B., Toner, J. P., and Susilo, Y.O. (2022) Examining the effect of integrated ticketing on mode choice for interregional commuting: Studies among car commuters. *International Journal of Sustainable Transportation.*
4. Zhao, X., Susilo, Y.O. and Pernestål, A. (2022) The long-term acceptance pattern of automated public transport service: Evidence from Stockholm. *Transportation Research part A*, 155: 450-463.
5. Palmberg, R., Susilo, Y.O., Gidofalvi, G., and Nagavi, F (2022) Towards a better understanding of the health impacts of one's movement in space and time. *Journal of Location Based Service*.

Conference Presentations:

1. Yagi, S., Nobel, D., Kawaguchi, H., Kimberly, A. and Susilo, Y.O. (2022) Application of the Smartphone-based Mobility Collector in Developing Countries - comparison with a conventional activity diary survey. The 12th International Conference on Transport Survey Methods: Travel Survey and Big Data, Porto, 2022
2. Palmberg, R., Susilo, Y.O., Gidofalvi, G., and Nagavi. F. (2022) Uncovering Biometric Effects of Spatial and Transportation Elements on Travellers Using Biometric Data. The 12th International Conference on Transport Survey Methods: Travel Survey and Big Data, Porto, 2022
3. Klementschitz, R., Mair, M. (2021): Strategien für flexible Mobilitätsangebote in ländlichen Urlaubsregionen, Projekt Smacker. 8. Tourismus-Mobilitätstag, Nachhaltige Mobilität im Tourismus, 20. Oktober 2021, Linz (Österreich)
4. Klementschitz R., Mair M. (2021): Strategies for DRT planning in rural and periurban areas. The Smacker project. 17th Meeting EUSALP Action Group 4 Mobility, Nice, (Frankreich) / online, 14. - 15. September 2021
5. Liguori G., Lepori C., Klementschitz R. (2021): Strategies for DRT planning in rural and periurban areas. The Smacker project. Interreg Central Europe - Roundtable on Demand Responsive Transport & Low-carbon Mobility, online, 5. Mai 2021