DAVeMoS

Newsletter

University of Natural Resources and Life Sciences, Vienna
Department of Landscape, Spatial and Infrastructure Sciences
Institute for Transport Studies – DAVeMoS research group

Newsletter Vol. 02/2021

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

1. Six lessons from the first year lockdowns in Europe

When we planned this newsletter edition in September, we thought that we have discussed enough about impacts of lockdown and COVID-19, and this editorial will be dedicated to automation related topics. That is said, when this editorial is written, we are in the middle of implementing another nation-wide lockdown. Another wave of lockdown made us think that perhaps it would be useful for our readers if we shared the summary of a special issue editorial which we initiated at the *European Transport Research Review*, based on evidences gathered from 11 papers across European countries.

In terms of context, these case studies give us range of evidences from different settings such as Greece, which undertook strong measures to control COVID-19 pandemic, to Sweden, which implemented relatively more relaxed measures towards COVID-19.

So, what common lessons do we see from these evidences?

Lesson 1: Mobility impacts of COVID restrictions vary greatly across countries, geographic areas and demographic groups - Whilst it is clear from the gathered evidence from all studied countries that there has been a significant reduction of movement due to the COVID-19 mobility limitation measures, the impacts are different across different sociodemographic groups, travel modes, trip purposes, and geographical locations.

Much evidence shows that many reductions are also due to issues beyond transport and mobility. For example, due to social engagement and type of occupations, women are more negatively impacted by COVID-19 restrictions. This calls into question the assumption that population can be treated as homogeneous. It is also clear that measures that may be suitable for urban settings cannot be simply transferred to rural areas.

(...)

Bundesministerium Klimaschutz, Umwelt, Energie, Mobilität, Innovation und Technologie
FFG Forschung wirkt.
Stadt Wien
Land Niederösterreich
Land Salzburg
Wiener Linien
Wirtschaftsforum Wald Viertel

Lesson 2: The local situation and individually perceived control matter - The effectiveness and suitability of COVID-19 measures also depend on the local impact of the pandemic, norms and available opportunities. A study in rural areas in Germany indicated a clear relationship between people's perception of no need for changes or even resistance to change and non-compliance.

Lessons 3: The evidence of long run mobility impacts is mixed - The evidence of the long-term impacts of movement restrictions on the speed-up of the digital transformation both in working and social life of people is so far mixed. That is said, whilst the propensity of individuals keeping their online working and social engagement beyond the pandemic period is relatively small, the findings consistently show that there is an agreement that people would travel, in particular flying, less and may be cycle more in the future. Whether such changes would become reality remains to be seen.

Lessons 4: Increased costs and reduced revenues challenge public transportation - One of the transport sectors which suffers a lot due to COVID-19 is public transport. There is a strong expectation among public transport users towards the operators to sanitize the vehicles for them during the pandemic period. However, respondents expect that these measures and improvements would be implemented while maintaining the same pre-COVID-19 ticket prices. This raises the question how the additional cost for such actions can be covered while still suffering from the reduction in passenger numbers. In other words, the economic viability of such measures is something that needs to be discussed and considered further.

Lesson 5: The importance of agile public transport operations under a supportive governance framework - The challenge for public transport operators is how to provide a high frequency, reliable and comfortable public transport service whilst keeping the speed of contagion down and in an affordable manner. During the pandemic the demand for public transport varies substantially as people from different socio-demographic groups responded differently towards the COVID-19 restrictions. This highlights the importance of operators' ability to reassign capacity to neighbourhoods whose residents are more likely to travel despite the COVID-19 restrictions due to the nature of their employments. At the same time, it is also important to revisit the readiness of the supply and infrastructure conditions so that operators would be able to implement the required changes as advised by the public health authorities.

Lesson 6: Is it time to revisit the thinking underlying our planning approach? - By end of the day, 'accessibility', not 'mobility' - to people, goods, services – should be the key purpose of the urban transport system under the pandemic era. More specifically, addressing the psychological consequences of fear, confinement and forced cohabitation or loneliness are strongly associated with the ability of people to have access to various activities with the use of the transport system.

More complete discussion of the findings can be found at the journal editorial piece:

Susilo, Y., Floden, J. & Geurs, K. Six lessons from first year COVID-19 restrictions: what can we do better in the future? (2021). European Transport Research Review, 13, 48. https://doi.org/10.1186/s12544-021-00513-2

Yusak Susilo

Bundesministerium Klimaschutz, Umwelt, Energie, Mobilität, Innovation und Technologie
FFG Forschung wirkt.
Stadt Wien
LAND NIEDERÖSTERREICH
LAND SALZBURG
WIENER LINIEN
WIRTSCHAFTS FORUM WALD VIERTEL

2. Using an agent-based simulation to better understand impacts of micromobility

A shared micromobility system has become an alternative mode of transport, in particular among younger and connected urban residents. Rose et al. (2021) reported that today, micromobility is present in 350 cities worldwide. Whilst for some it is just another mode of transport, micromobility offers unique opportunities and challenges for transport and urban planners. It allows users to access and egress the transport modes in a much more random manner, which increases the individual accessibilities, whilst at the same time it increases the challenges of regulating and managing the supply. Furthermore, the impacts of these new modes on the overall transport system are largely unknown as they cannot be easily integrated and analysed in conventional transport planning models.

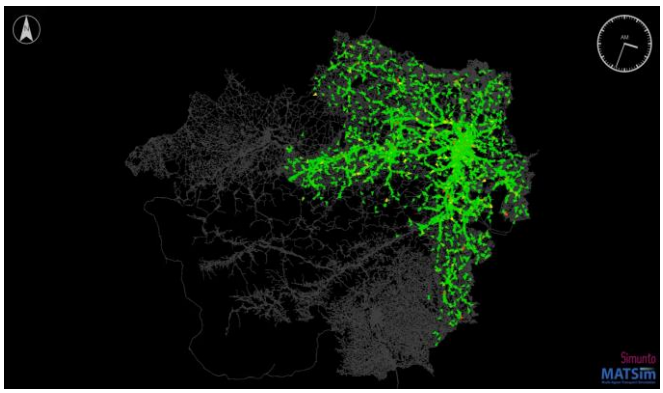
Thus, with support of ITS Vienna Region and Wiener Linien, DAVeMoS aims to develop an agent-based model, using Multi-Agent Transport Simulation (MATSim), to explore the impacts of micromobility in Vienna and Lower Austria regions. This activity also will be intertwined with the ongoing JPI Urban Europe SmartHubs project (www.smartmobilityhubs.eu).

This is not the first attempt to build MATSim in Vienna region. Müller et al. (2021) built an agent-based model in Vienna using open data (e.g. open street map (OSM) for the network and European Union Statistics on Income and Living Conditions (EU-SILC) for population synthesis), with which they modeled shared autonomous electric vehicles. Another example of previous attempts is Luger (2017) who created population synthesis using multidimensional iterative proportional fitting and discrete choice model using data from EU-SILC. More recently, MATSim was also used in the *auto.WAVES* project (Bruck 2020).

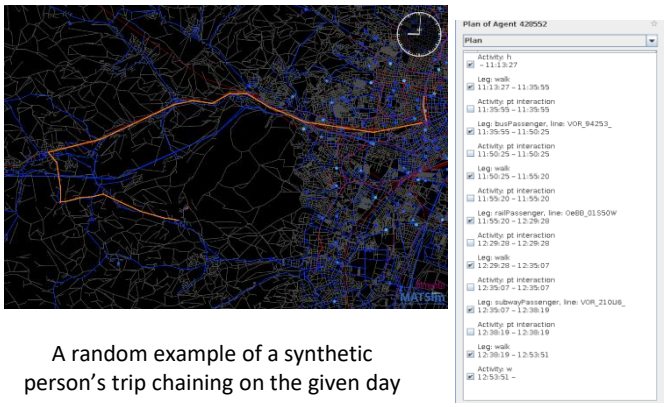
Our unique approach now is to develop MATSim based on the existing VISUM model of ITS Vienna Region. This will allow us to combine the benefits of both, agent-based and zone-based transport models, in a systematic and step-wise procedure for analyzing the impacts of micromobility to our transport system.

Combining two different model approaches is not without challenges. There are a number of theoretical developments that DAVeMoS modelling team will address, but this is something we are looking into in close coordination and collaboration with our stakeholders and with colleagues from the transport research community in Austria.

DAVeMoS Modelling Team



Simulation of car trips in the East Region (10 % load)



A random example of a synthetic person's trip chaining on the given day

References:

1. Rose J., D. Schellong, C. Schaetzberger and J. Hill (2021) How e-scooters can win a place in urban transport, https://www.bcg.com/publications/2020/e-scooters-can-win-place-in-urban-transport. Accessed: 2021-06-7.
2. Müller, J., Straub, M., Naqvi, A., Richter, G., Peer, S., & Rudloff, C (2021) MATSim Model Vienna: Analyzing the Socioeconomic Impacts for Different Fleet Sizes and Pricing Schemes of Shared Autonomous Electric Vehicles, Proceedings of the 100th Annual Meeting of the Transportation Research Board.
3. Luger B. (2017) Generation of a Synthetic Population for MATSim Models Using Multidimensional Iterative Proportional Fitting and Discrete Choice Models, Master's Thesis, TU Graz
4. Bruck E., A. Soteropoulos, M. Berger, R. Scheuvens et al. (2020) Straßenräumliche Wirkungen und Verträglichkeit des autonomen Fahrens im Raum Wien; Studie im Rahmen des Vorhabens auto.WAVES. Technischer Bericht. Wien; 2020.

3. FSV Seminar "Mobility as a service and the street space"

In cooperation with the Austrian Research Association for Roads, Railways and Transport (FSV), a two-day planning seminar was held on 30.09. and 01.10.2021 at Semmering (Lower Austria). Against the background of increasing digitalization of transport, concepts of satisfying mobility needs independently of vehicle ownership and individually tailored to the current situation of transport supply and demand, were discussed on the basis of keynote speeches. In addition to the presentations on current developments, experiences from practice in Austria and Germany were also introduced.

Prof. Yusak Susilo gave a presentation on the topic of "Mobility as a service - Prerequisites for a contribution to the mobility transition", in which he provided experiences from Sweden. In order for this approach to lead to the desired mobility turnaround, some organizational and planning issues need to be resolved. In particular:

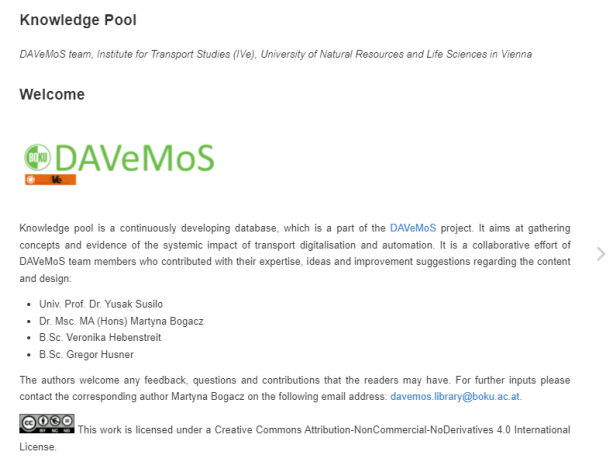
- How is the minimum/optimal service for these mobility services structured?
- Which actors need to be involved?
- What responsibilities need to be assigned?
- What framework conditions need to be set?
- Is the public transport service always the starting point for planning?
- Sharing instead of owning: Is the disappearance of individual car ownership conceivable and realistic?
- Which spatial requirements in the street space can be changed by mobility as a service?

Despite the difficulties due to the COVID-19 pandemic, the event was well attended. Participants were able to take home many new ideas and the virus was successfully kept away from the event. It is also planned to publish the presented contents of the event in the FSV publication series at the beginning of next year.

Roman Klementschitz

4. Knowledge Pool: An online library on digitalization and automation

After a year-long effort, DAVeMoS completed the first edition of Knowledge Pool which is an online library, available at: davemos.online/knowledge-pool. It provides an overview of the current state-of-the-art of selected concepts within automation and digitalization of transport.

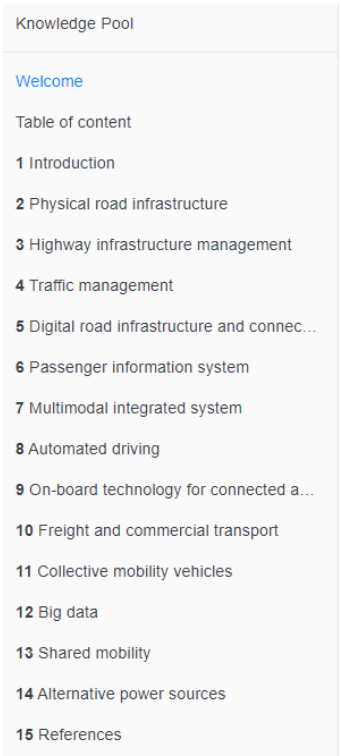


DAVeMoS' Knowledge Pool Homepage

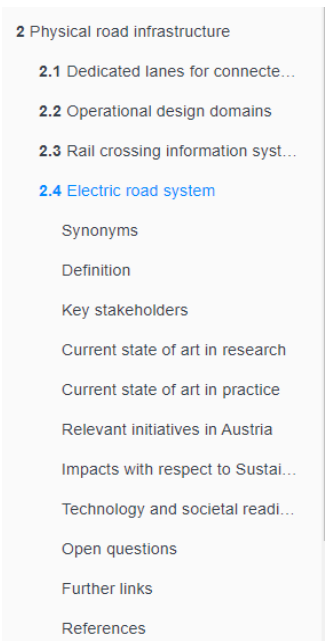
Constant technological development shapes and transforms current transport systems, which has a significant impact on the everyday lives of individuals as well as societies as a whole. Moreover, the actual progress and implementation of automation and digitalization differ across different sectors, parts of the world and transport modes. Therefore, the Knowledge Pool was created to help understand the complexity of the current digital transformation and its implications at the individual and systemic levels. It aims at orientating the reader within the topic, where the key concepts are described based on a thorough review of recent scientific literature within the field from all around the world as well as existing projects and initiatives from the industry. Consequently, we were able to gather evidence of the progress concerning research as well as the practice. Moreover, this approach allowed us to evaluate the changes that take place globally as well as situate Austria in a bigger perspective.

The structure of the Knowledge Pool was dictated by its underlying rationale to demonstrate the state and impact of recent digital transformation in an approachable manner. Consequently, each topic begins with the available synonyms and the definition of a concept, followed by the key stakeholders divided into those who are affected by the changes and those who are the key drivers of the development. Moreover, we included sections on the current state of the art in terms of research and practice.

Beyond, we provide a list of recent initiatives that take place locally and we present the impact of each concept on the selected Sustainable Development Goals (SDG). Furthermore, we assessed the collected evidence in the context of two frameworks, namely technology and societal readiness scale (Williamson & Beasley, 2011; McCulloch, 2019). The use of widely recognized SDGs and two theoretical frameworks allowed us to provide, on one hand, a concise summary of the impact and, on the other hand, a consistent and standardized measure of the development status.



The categories of topics



Example of topic structure

Each topic ends with a list of open questions that shed the light on the potential direction of the future development of it. The selection of topics included in this first edition of the Knowledge Pool comprises the most trending ones within the appropriate literature,

(…)

governmental and industry reports. They were split into 13 categories to make the navigation easier.
We aimed at covering a wide range of areas from collective and individual passenger transport solutions through commercial and freight transport to Big Data applications. Moreover, we described the progress and challenges associated with connected and automated vehicles, their built and digital infrastructure and onboard technologies. We also included a broad spectrum of modes within micro-, shared and collective mobility such as demand responsive transit, passenger drones or bicycle sharing. Nonetheless, our focus was also on the integrative solutions including MaaS, mobility and freight hubs or park and ride.
The Knowledge Pool is continuously developing and it is expected to evolve along with the changes brought about by the progress in automation and digitalization. Therefore, we are open for feedback and new topic suggestions from our readers.

References:

1. Williamson, R., & Beasley, J. (2011). Automotive technology and manufacturing readiness levels: a guide to recognised stages of development within the automotive industry. URN11/672.
2. McCulloch, S. (2019). Social Acceptance And Societal Readiness Levels. DecarboN8. Available at: https://decarbon8.org.uk/social-acceptance-and-societal-readiness-levels [Accessed: 3 December 2021].

Martyna Bogacz

5. SmartHubs first workshop in Brussels, 14-15 October 2021: Open Data Platform

For the first time in the SmartHubs project, a physical meeting was held, hosted by the Belgian project partner Vrije Universiteit Brussel. The SmartHubs project is examining mobility hubs, which are specific locations on the street where citizens can choose between different shared and sustainable mobility options. Progress was made during the meeting to review the state of the art, which will be documented in a separate report available on the project website (https://www.smartmobilityhubs.eu/) by the end of 2021. After defining what makes a mobility hub SMART, an integration ladder was created to categorize mobility hubs, including four dimensions:

- Physical integration,
- Digital integration,
- Democratic integration, and
- Inclusive design.

In addition, we discussed which planning and design tools should be used in each of our Living Labs in the Netherlands, Belgium, Germany, Austria, and Turkey, starting in 2022. An open data platform on examples of SmartHubs was created and filled with first locations, you can find more on our open data platform: https://lnkd.in/dn4Nzp3m. This data platform will be filled with more information in the upcoming months.
The meeting ended with a site visit to the SmartHubs location in Anderlecht, a district of the city of Brussels. Besides the current research work itself, the project team is looking forward to the upcoming physical meetings in The Hague/Rotterdam and Vienna in spring and fall 2022, respectively.

Roman Klementschitz

6. Demand-responsive transport in Salzburg

Introduction

DRT systems have been established across Europe for many years. In Austria, programs such as 'Mikro-ÖV Systeme für den Nahverkehr im ländlichen Raum' have assisted in the development of multiple DRT systems. Currently, more than 250 services, in more than 650 municipalities, are in operation in Austria (mobyome, 2021).

A plethora of past international research efforts has focused on DRT systems, contributing to not only the optimisation of the characteristics (e.g. routing algorithms) but also the development of evaluation frameworks. However, there is still no standardised evaluation framework in the Austrian context. The objective of the research conducted by the DAVeMoS team is to broaden the knowledge on Demand Responsive Transport success factors by investigating the parameters which affect the usage patterns, the satisfaction level of the users, and the needs and requirements of users and non-users in areas with existing DRT systems in Austria.

Methodology

To reach the research objective a research approach has been designed, considering two case studies. The first case, the *W3Shuttle*, is a DRT system that is organised by and serves three different rural municipalities. The second service, the *WalsieBus* runs also across a rural municipality, in proximity to the city of Salzburg. Both services require requesting a ride beforehand and are already established for some years in the transport system of their respective area. Some of the main characteristics of the two systems are summarised in Table 1. To prepare ourselves to our data collection analysis, a set of key performance indicators was identified based on the inputs from the literature and interviews with stakeholders of DRT services. The primary data collection was carried out with the service users.

Data collection and sample

The survey was conducted in September 2021 and a combination of volunteer sampling and opportunity sampling is applied. The invitation for participation was distributed online on various platforms, including social media accounts of the local tourism associations, the website of the municipalities, and at various local points of interest (see Figure 1, next page). In addition, four interviewers conducted and distributed surveys on the spot in all villages served by the W3Shuttle for 10 days, spread across the data collection period.

In total, 223 valid survey responses were submitted. The participation of men and women is unbalanced, with more female (56%) than male (44%) respondents. Most survey respondents are between 18 and 65 years old (84%), and work full-time. The majority are Austrian citizens (60%) from the region of Salzburg (48%), and the highest ratio are residents of the study area (n=96, 43%). However, more than 1/3 of the sample members (35%, n=70) are German tourists. Regarding the travel mode by which those arrived in the study area, seven out of ten reported travelling by private car either as passengers or drivers and that they also intend to travel by the same mode during their stay. Though, a significant percentage (28%) accessed the area by travelling more sustainably, for instance by train.

Usage and satisfaction with W3Shuttle

During the interviews, the stakeholders of the service consistently mentioned that the level of awareness of the service is one of the most important indicators for the measurement of its success. In terms of usage level, more than half of the sample (n=127, 57%) have travelled with the W3Shuttle at least once. The collected data reveal that the W3Shuttle is known to almost all survey participants, with 90% of the locals/commuters and 84% of tourists/visitors reporting that they had already heard of the system before.

(...)

Table 1: Demand Responsive Transport case studies in Land Salzburg

	W3Shuttle	WalsieBus
Municipalities	Pfarrwerfen, Werfen, Werfenweng	Wals-Siezenheim
Vehicle capacity	8	7
Flexible stops	Yes (door-to-door)	No (virtual stops)
Flexible timetable	No	Yes
Target group	Local population, tourists/visitors, students	Local population - Commuters
Connection with public transport	Connection with train (local, national, international) at Bischofshofen, Pfarrwerfen, Tenneck & Werfen train stations	Connection with 4 public transport bus lines
Booking method	Via phone call to telephone center	Via phone call to driver
Ride prioritization	No	Yes (1. Connection to PT, 2. Student trip (outside school bus service hours), 3. Transport to community facilities, 4. Trips within single area)

Among the users, more than 60% are well familiar with the service, as they have taken at least two rides. The data of the latest trip performed with the on-demand system by the users reveals that the majority of the trips start from the municipality of Werfenweng, and the most common origin-destination (OD) pair is Werfenweng to Bischofshofen train station (Figure 2). The latter indicates the usage of the DRT system as a last-mile mode. It is worth mentioning that in the present analysis the trips to the other train stations are included at the level of the respective municipality. Thus, the role of the W3Shuttle service as an access/egress mode to train might be even more important. With regards to the trip purpose distribution, travelling for recreational or leisure activities is by far the most popular reason (n=46, 39%) among the reported trips (n=117).

Figure 1: Photos from the distribution and conduction of surveys on the W3Shuttle system in September 2021

The users report a high satisfaction rate with the service overall. The satisfaction is significantly correlated (Spearman's correlation) with the level of satisfaction with individual elements of the service such as the personnel behavior, feeling of safety and security, temporal coverage, and punctuality.

Next steps

The project is still ongoing, and within the next few months, we will continue with two more data collection efforts, one on the W3Shuttle service and another on the WalsieBus. On the one hand, the second data collection on the W3Shuttle system will provide insight into the usage patterns and passenger satisfaction in winter when the travel needs of both locals and tourists are different than in the summer time. The analysis of the collected data will also enrich the present knowledge on the determinants of the system attractiveness and performance (e.g. weather-related). On the other hand, the data on the system in Wals-Siezenheim will allow the analysis of the usage patterns and user profile of a system with different characteristics than the W3Shuttle, such as virtual stops and flexible timetable. Finally, the comparison of success factors of the two case studies will allow for identifying whether a common set of determinants affect different DRT services.

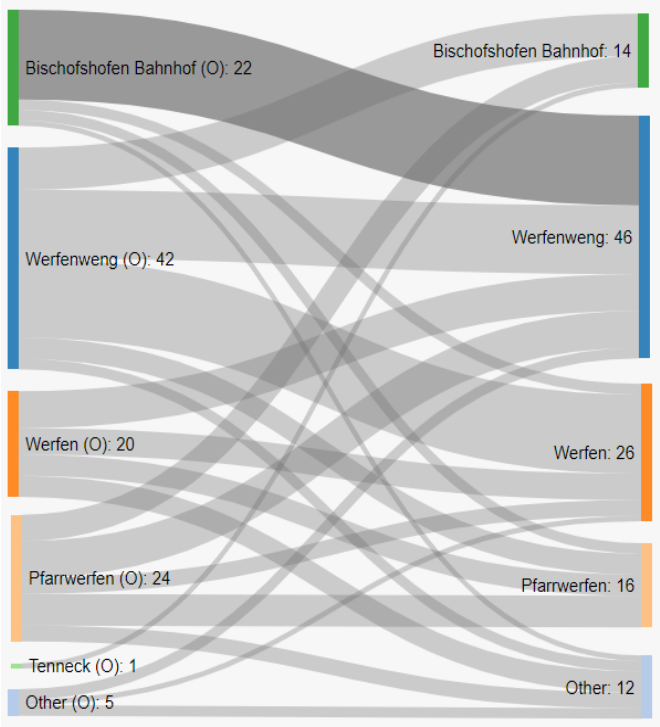


Figure 2: Origin-Destination for trips by the W3Shuttle service

Special thanks to the three local communities in the municipalities of Werfen, Werfenweng, and Pfarrwerfen for supporting the data collection effort.

References

Mobyome (2021). Bedarfsverkehr in Österreich. Statusreport 2021. (https://www.bedarfsverkehr.at)

Roxani Gkavra, Roman Klementschitz

Bundesministerium Klimaschutz, Umwelt, Energie, Mobilität, Innovation und Technologie
FFG Forschung wirkt.
Stadt Wien
LAND NIEDERÖSTERREICH
LAND SALZBURG
WIENER LINIEN
WIRTSCHAFTS FORUM

7. International research exchanges on the future of transport system

On November 4th, DAVeMoS was invited to provide a keynote at the research exchange event with the theme "*Mit Zug und Bus in die Zukunft*" (by train and bus to the future) initiated by the Institut français d'Autriche, in collaboration with the Swiss Embassy and the Austrian Ministry of Transport (BMK). Dr. Roider delivered a keynote speech, together with experts from *UrbanLoop* in France, the Swiss Federal Railways, and BMK.

On the following day, November 5th, DAVeMoS was visited by a delegation from University of Lorraine and the French Embassy to discuss possible research as well as student exchange activities, followed by a small group meeting with the French Ambassador for Austria.

Yusak Susilo

8. First DAVeMoS Day and inaugural lecture

On November 8th, the first DAVeMoS Day was held. During this day, six selected research topics were presented to DAVeMoS research, funder and coordination board members. The presented materials included

(1) the preliminary results of demand-responsive transport study in Salzburg,
(2) the results-to-date of SmartHub project,
(3) DAVeMoS' online Knowledge Pool,
(4) the development of Virtual Reality environment to explore e-scooter users' behaviour,
(5) latest update of the three waves data collection of a comprehensive time-use study in Austria, and
(6) latest status of agent-based model development in Austria's Eastern Region.

Due to the COVID-19 circumstances, the event was held in the hybrid mode and was attended by around 20 people from 12 institutions.

The event was followed by a visit to the Virtual Reality Lab, a Funders' Board meeting, and closed by the inaugural lecture of Professor Susilo.

We are very grateful for another successful year of DAVeMoS, despite the pandemic situation, for the continued support of DAVeMoS funders, research and coordination board members, as well as friends and colleagues in the transportation research community in Austria.

Yusak Susilo

Bundesministerium Klimaschutz, Umwelt, Energie, Mobilität, Innovation und Technologie
FFG Forschung wirkt.
Stadt Wien
LAND NIEDERÖSTERREICH
LAND SALZBURG
WIENER LINIEN
WIRTSCHAFTS FORUM WALDVIERTEL

9. List of DAVeMoS activities (04/21 – 11/21)

In Management:

1. DAVeMoS has completed its first DAVeMoS Day, which was organized to present DAVeMoS' research activities and also to stimulate research exchanges between DAVeMoS' stakeholders in the field of digitalization and automation.

On the Research:

1. In the last six months, DAVeMoS team has published 6 web-of-science publications, 3 book chapters, 2 peer-reviewed conference articles, 4 guest lectures and 1 journal editorial.
2. DAVeMoS also co-organised a 2-days FSV seminar on mobility as a service, co-organised one international conference in transport system resilience, and participated in a State B2B Visit between Austria and Estonia.
3. During this reporting period, DAVeMoS has been investing in building Virtual Reality facilities in order to understand the road user interactions in a crowded urban space, and also to provide a new platform for the university students and researchers to have a 'hands-on' learning experience with new types of mobility, biometric, and spatial data analyses.
4. DAVeMoS team member has been listed among the Top 2% of Scientists Worldwide in 2020.
5. In response to the recent crisis due to the COVID-19 pandemic, DAVeMoS has been actively investigating the role of digitalisation in sustaining people's lifes and well-being. A series of collaborations have been initiated, from contributing to the collection of three waves of time-use diary in Austria to stimulating research activities around Europe through a special issue call in the given topic. The special issues now have been completed and are publicly accessible.

In Education:

1. In this autumn DAVeMoS has started two courses, one about research methods in transport science and one about Big Data analysis for urban planning. DAVeMoS also contributed to BOKU's T2S Doctoral School.
2. Two DAVeMoS' externally co-supervised PhD theses at Leeds and NTU Singapore have been successfully defended, and one BOKU Master's thesis has been completed with a distinction outcome.
3. Currently DAVeMoS is still supervising five challenge-driven Master's thesis which topics are requested/inspired by the research discussions with DAVeMoS' stakeholders.

10. List of DAVeMoS publications (04/21 – 11/21)

Peer-reviewed journal:

1. Endrayana Dharmowijoyo, D.B.; Susilo, Y.O.; Joewono, T.B. Residential Locations and Health Effects on Multitasking Behaviours and Day Experiences. *Sustainability* 2021, 13, 11347.
2. Palmberg, Robin C.O., Yusak O. Susilo, Győző Gidófalvi, and Fatemeh Naqavi (2021) Built Environment Characteristics, Daily Travel, and Biometric Readings: Creation of an Experimental Tool Based on a Smartwatch Platform, *Sustainability* 13, 17: 9993.
3. Ilahi, A., Belgiawan, P.F. Balac, M., Axhausen, K.W. (2021) Understanding travel and mode choice with emerging modes. *Transportation Research part A*, 150: 398-422.

Editorial:

1. Susilo, Y., Floden, J. & Geurs, K. Six lessons from first year COVID-19 restrictions: what can we do better in the future? (2021). European Transport Research Review, 13, 48. https://doi.org/10.1186/s12544-021-00513-2

Conference Presentations:

1. Stojanovski, T. and Susilo, Y. (2021) Flexible Parking Norms and Sustainable Mobility Choices. World Symposium on Transport and Land Use Research 2021 (on-line), Portland, USA, August 2021.
2. Koch, S., Khomenko, S., Cirach, M., et al. (2021) Health impact assessment of COVID-19 confinement-related changes in environmental and health behaviour exposures on cardiovascular and mental health. The 33rd Annual Conference of the International Society for Environmental Epidemiology, New York, USA, August 2021

Book Chapter:

1. Susilo, Y., Darwish, R., Pernestal, A., Chee, P.N.E. (2021) Lessons from the deployment of the world's first automated bus service on a mixed public road in Stockholm, pp. 109-120. In: Transport in Human Scale Cities, edited by Mladenović, Toivonen, Willberg, and Geurs, Edward Elgar; ISBN: 978-1-80037-050-0.
2. Chen, C., Susilo, Y.O. (2021), Trip Chaining Analysis. In: Edward Chung (Ed.) Roger Vickerman (Ed.), International Encyclopedia of Transportation 4, pp. 606-611, Elsevier; ISBN 978-0-08-102672-4.
3. Priya Uteng, T., Susilo, Y.O. (2021): Women and Transport Modes. In: Edoardo Marcucci (Ed.) Roger Vickerman (Ed.), International Encyclopedia of Transportation 5, pp. 656-664, Elsevier; ISBN 978-0-08-102672-4