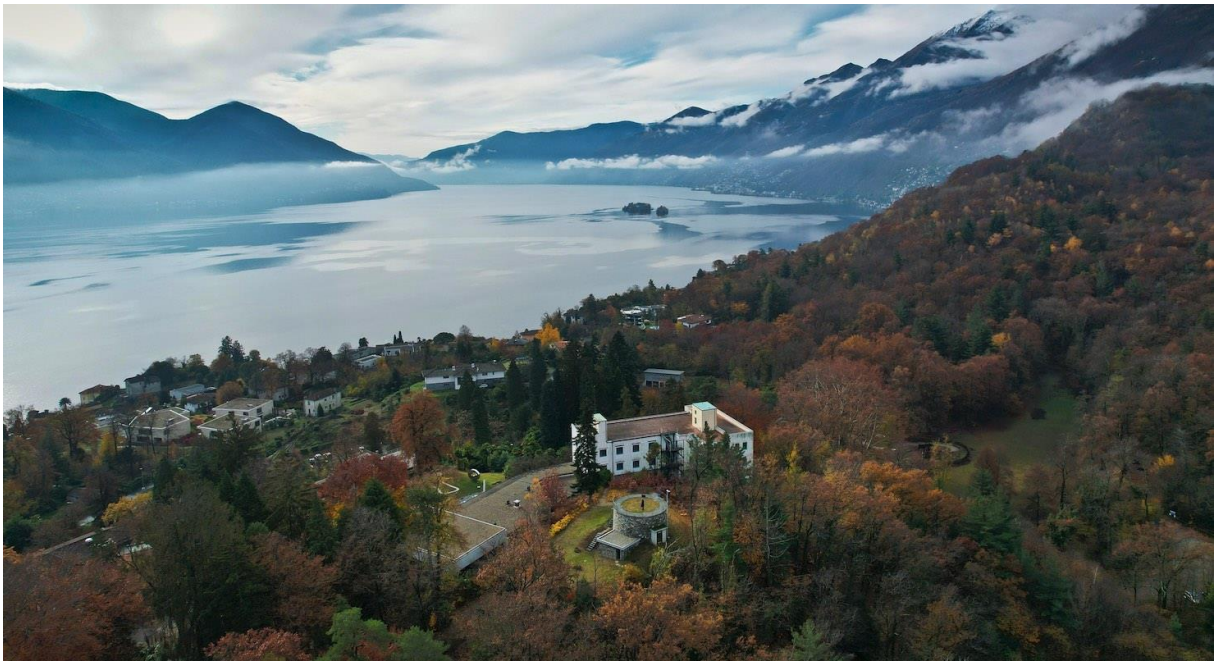
Conference Programme



STRC

26th Swiss Transport Research Conference

Monte Verità / Ascona, May 20 – 22, 2026

https://strc.ch/2026.php

1. Foreword from the Organizers

A Warm Welcome to the 26th edition of the Swiss Transport Research Conference (STRC).
The Swiss Transport Research Conference (STRC) has been a cornerstone of multidisciplinary knowledge exchange and innovation in transportation and land use since 2001. For over two decades, STRC has consistently served as a platform for advancing cutting-edge research, influencing transportation practices, and shaping policy directions both in Switzerland and internationally. Bringing together the best academics, researchers, consultants, governmental representatives, and practitioners from Switzerland and beyond, STRC fosters collaboration and drives progress in all transportation-related fields. Topics discussed include multimodal transportation, supply chains, operations research, railways, airways, road, public transport, computer vision, control, machine learning, and many more.

Inspiring Programme & Keynotes.
The conference fosters collaboration and innovation through a rich program of presentations and discussions. This year, 69 contributions from leading Swiss Universities and 3 Industry Sponsors will address a wide array of topics such as Demand Modeling, Public Transportation and Shared Transport Operations, Transport Data Science and Machine Learning, Sustainable Urban Mobility Planning, Traffic Flow and Control, Logistics, and Autonomous and Intelligent Transport Systems (ITS) – among many others. In addition to that, the following international keynote speakers will contribute to the programme with their talks:

- **Prof. Dr. Yoram Shiftan**, Israel Institute of Technology (TECHNION), Israel
- **Prof. Dr. Oded Cats**, Delft University of Technology (TU Delft), Netherlands
- **Prof. Dr. Cathy Wu**, Massachusetts Institute of Technology (MIT), USA

Appreciation of our Sponsors.
We would like to express our heartfelt gratitude to this year's sponsors: Swiss Federal Railways (SBB), Planzer Logistics, and Swiss Post (PostCH). Your generous support and commitment have made this conference possible, and we deeply appreciate your contribution to its success.

Looking Forward to Meeting You in Ascona!
On behalf of the STRC organizing committee, Dr. Kevin Riehl, Dr. Anastasios Kouvelas,
Traffic Engineering Group (SVT), Institute of Transport Planning and Systems (IVT), ETH Zürich

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2. Important Information for Participants

2.1 Communication / Contact Details

For questions regarding the conference, please send us an e-mail: **strc2026@ethz.ch**
Furthermore, we set up a group chat on WhatsApp, feel free to join via this link:
https://chat.whatsapp.com/KWGH1P86FiBGNJdJuUyHuH

2.2 The Conference Venue

The conference takes place in the hotel of Monte Verità, at following address:

Fondazione Monte Verità
Strada Collina 84
CH-6612 Ascona
Link on Google Maps: **Monte Verità (46.15°N, 8.76°E)**

The conference venue is near the cities of Ascona and Locarno. The auditorium is located on the ground floor. The dining room and the remaining rooms are located on the first floor, directly above the auditorium.

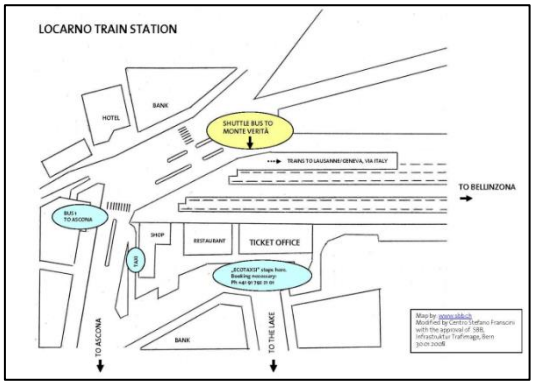
2.3 Arrival & Departure Shuttle Bus Information

We recommend travelling by train to Locarno as there are only a limited number of parking spots.

On Wednesday 20th May there will be a shuttle service from Locarno train station to Monte Verità.

The first **bus departs at 11:00** from Locarno station.

We recommend attendees plan their arrival at Locarno station **before 13:00**.



Shuttle Service Schedule

Wednesday 20th May				Friday 22nd May			
From	To	Departure Time	Seats	From	To	Departure Time	Seats
Locarno Station	Monte Verità	11:00	30	Monte Verità	Locarno Station	13.45	50
		11:30	8			14.25	50
		12:00	30				
		12:40	50				
		13:00	14				

2.4 Hotel Information & Conference Registration

Hotel **check-in is from 15:00, check-out until 10:00**. For those staying at La Perla (outside of Monte Verità conference venue), please **check in after 15:00 and before 21:30**.

Your name badge can be found at the reception desk of the Monte Verità conference site. On the first day of the conference, the organizers will welcome you in person. Please do not forget to sign on the registration list.

2.5 Catering: Breakfast, Lunch & Dinners

Breakfast and lunch will be served at the conference venue (Monte Verità). Breakfast will be served **from 07:30 until 10:00**. Lunch **starts at 12:00**.

For dinners, we will visit two restaurants in the city of Ascona, in which we will explore Italian cuisine. The dinners are within walking distance from the conference venue. However, there will also be a shuttle bus departing from Monte Verità **at 19:00 and back at 22:00** on both days.

Dinner 1: (Wednesday, May 20th 2026, 19:15h)
Grotto Baldoria (Via Sant'Omobono 9, 6612 Ascona)
Distance on foot from Fondazione Monte Verità: 15–20min

STALLA DEGLI ANGIOLI
ASCONA

Dinner 2: (Thursday, May 21st 2026, 19:15h)
Ristorante Stalla Degli Angioli (Via Albarelle 3, 6612 Ascona)
Distance on foot from Fondazione Monte Verità: 15–20min

2.6 Annual Conference Photo

On Thursday, **May 21st at 17:15h**, we take a group photo directly on the steps in front of the building. Please be there on time so that you're sure to be in the photo.

2.7 Annual Committee Meeting

The conference meeting for principal investigators (PIs) of the labs will take place on Thursday, **May 21st at 17:30 - 18:30** in the Eranos room (all PIs of the organizing institutes of STRC Conference and conference staff 2026).

2.8 Social Programme

This year, we offer the chance to learn more about Monte Verita's unique history on May 21st, 17:30-19:15. If you are interested to join a **guided tour of the Monte Verita Museum**, d**rop us an email with the title "[STRC2026] SocialProgramme Registration"**. **Spots are limited** to 20 participants. **Registration Deadline: May 20th 18:30.** We will select participants with a lottery.

2.8 Instructions for Session-Chairs

General Information:

Congratulations, you have been selected as a session chair at STRC. This responsible role is crucial for a successful conference, and we already thank you in advance for your support. In the following, you will find instructions on your role, before and during the STRC conference.

Before STRC:

- Reach out to all presenters of your session, and present yourself as session chair.
- Facilitate **peer-review between session-participants via email, at least two weeks before the conference** (each participant reviews the contribution of the preceding presenter; you as session chair review the first one).

During Your STRC Session:

- The last presenter of each session also chairs the session.
- Please arrive in the room 5 minutes before the session and check that the projector is working.
- Please make your computer available for the presentations, which are passed over by the presenters either by memory stick or via email, or help the presenters to connect their computer to the projector.
- The presentation length will be 20 minutes. This has to be checked by you as a Session-Chair. The discussion round must not last longer than 5 minutes.
- Please prepare sheets of paper with times that you can hold up to tell the presenter the remaining time. We recommend 5 minutes and 2 minutes.
- When the time is up, please politely interrupt.
- For the Auditorium: Please be ready to pass the microphone around for the discussion.
- After the discussion, please immediately help the next presenter to set up their presentation. Please then start immediately with the introduction for the next presentation.
- When all the presentations in your session are finished, please put the room back the way you found it.

2.9 Instructions for Academic Participants

Presentation:

Please find below the instructions to present at the STRC-Conference as academic participant:

- Presentation length will be 20 minutes
- Followed by 5 minutes of questions
- Please use your institution template for your slides.

You can bring your presentation on a memory stick or use your own computer for the presentation. Or you can send your presentation to the session-chair via email.

Consider providing the following information in your slides:

- Title, name, affiliation
- What is the research question?
- Precise problem statement
- Overview of previous works
- Your proposed solution
- If applicable: future steps within your project

Peer-Review:

- Each session presenter should review the paper following their own presentation if the paper is available (information is provided in the conference program). The last person of the session reviews the paper of the first presentation of the session.
- Please find the papers of your sessions in your session-folder that you have received via email before the conference.
- Based on your review, you are invited to pose the first questions in the Q&A session of the corresponding paper to facilitate a smooth discussion.
- Please note: The papers are not publicly available until the final submission after the conference. Therefore, please ensure confidentiality regarding the draft versions of the papers.

Optional: Final Paper for Proceedings:

- **If you wish your paper to be uploaded on the STRC-Homepage** please contact the organizing committee. The organizing committee will then publish the latest version of your submitted paper on the STRC-Homepage.

3. Conference Overview

3.1 List of Participants

▼ Family Name	First Name	Organisation
Alahi	Alexandre	EPFL, VITA
Ambühl	Lukas	Transcality
Anagnostopoulos	Georg	EPFL, LUTS
Ancupane	Amelija	TU Delft
Ataç	Selin	HEIG-VD
Avci	Batuhan	EPFL, LUTS
Axhausen	Kay	ETH, IVT
Balac	Milos	ETH, IVT
Baud	Candice	EPFL, TRANSP, OR
Benzoni	Stefano	UZH
Bierlaire	Michel	EPFL, TRANSP, OR
Borhani	Yasamin	EPFL, VITA
Braess	Patrick	ETH, IVT
Breu	Giuliana	SwissPost
Brugger	Elisabeth	ETH, IVT, TS
Cats	Oded	TU Delft
Chen	Ran	EPFL, LUTS
Chen	Qiuzi	EPFL, HOMES
Corman	Francesco	ETH, IVT, TS
Cotti	Tim	FHNW
Dahmen	Victoria	ETH, MieLab
Danalet	Antonin	SBB
De Lapparent	Matthieu	HEIG-VD
Deng	Jialin	Ghent University
Dulex	Nicolas	SBB
Erath	Alexander	FHNW
Fatemi	Tristan	INIT SE GmbH
Feng	Lan	EPFL, VITA
Gao	Yang	EPFL, VITA
Gerard	Valentin	EPFL, VITA
Gong	Jinrui	Zhejiang University
Grimal	Richard	France Matris
Grisiute	Ayda	ETH, Cartography
Guggisberg	Davi	VD
Haller	Jonas	ETH, PHYSIK
Han	Xiang	UZH
Hassan	Mariam	EPFL, VITA
Hausner	Maurice	CarMedialab GmbH
He	Xuan	ETH, IVT, TMP
Heinen	Eva	ETH, IVT, TMP
Hettinger	Thomas	SBB
Haghighi	Yasaman	EPFL, VITA
Hickert	Cameron	MIT
Hillel	Tim	UCL
Holmgren	Arlene	ETH, IVT, TMP
Hosseininejad	Reyhaneh	EPFL, VITA
Imstepf	Eric	SwissPost
Janssen	Tom	ETH, IVT, TS
Jia	Zuoning	EPFL, HOMES
Jiang	Haoran	EPFL, HOMES
Kaddoura	Ihab	SBB

▼ Family Name	First Name	Organisation
Kaufmann	Heiner	SBB
Klasovita	Viera	ETH, IVT, TS
Kouvelas	Anastasios	ETH, IVT, SVT
Lallemand	Louise	EPFL, TRANSP, OR
Laviolette	Jerome	ETH, IVT, TS
Li	Qiaosen	ETH, IVT, SVT
Lindner	Björn	Planzer
Lorch	Peter	ETH, IVT
Lordieck	Jan	ETH, IVT, TS
Luan	Po-Chien	EPFL, VITA
Makridis	Michail	ETH, IVT, SVT
Masse	Florian	TPG Geneve
Megh	Shukla	EPFL, VITA
Meli	Jonas	ETH, IVT, TMP
Miotti	Marco	ETH, EcoSystems
Molyneaux	Nicholas	Canton de Vaud
Ni	Ying-Chuan	ETH, IVT, SVT
Ortelli	Nicola	TPG Geneve
Ouyang	Tongcheng	ETH, IVT, TS
Paulish	Anna	EPFL, HOMES
Preto	Anne-Valerie	EPFL, SBB
Prunelle	Vogler	EPFL, TRANSP, OR
Raghavan	Shreyaa	MIT
Rames	Clement	EPFL, LASUR
Raubal	Martin	ETH, GeoInformation
Reiffer	Anna	ETH, IVT, TMP
Ricard	Léa	EPFL, TRANSP, OR
Rieg	Fabian	UNISG
Riehl	Kevin	ETH, IVT, SVT
Roman	Orlando	ETH, IBI
Romera Guereca	Gloria	ETH, CSFM
Roper	Josephine	UZH
Roth	Jakob	UniBa
Scherer	Patrick	ETH, IVT
Scherrer	Maike	Planzer
Schimohr	Katja	ETH, IVT, TMP
Schlapbach	Julius	ETH, IVT, SVT
Schmid	Basil	ARE
Schwab	Laura	UniBa
Sciara	Gian-Claudia	WSL
Shiftan	Yoram	Technion
Sun	Linghang	ETH, IVT, SVT
Susnjar	Marko	EPFL, LUTS
Thomas	Ramseier	ETH, IVT, SVT
Tomarchio	Barbara	EPFL, TRANSP, OR
van Eggermond	Michael	FHNW
Vuppala Narasimha	Krishna Kanth	ETH, IVT, SVT
Wang	Xiaoyan	EPFL, HOMES
Wu	Cathy	MIT
Zhang	Kenan	EPFL, HOMES
Zheng	Jiemin	HKUST
Zolfimoselo	Yasaman	EPFL, LUTS

3.2 Keynote Speakers

Prof. Dr. Yoram Shiftan (Israel Institute of Technology, TECHNION)

Yoram Shiftan is Professor of Civil and Environmental Engineering at the Technion – Israel Institute of Technology, where he holds the Joseph Meyerhoff Chair in Urban and Regional Planning. His research focuses on travel behavior, transport policy, activity-based modelling, transportation system analysis, project evaluation, and the intersections of transport, land use, the environment and economics. He heads the Israeli Smart Transportation Research Center, has been editor of Transport Policy, chaired the International Association of Travel Behavior Research (IATBR), and served as consultant on major strategic transport investments including policy formulation and cost-benefit evaluations.

Keynote on Wednesday 20th May: "Can we mitigate congestion without major investments in mass transit: A Travel Behavior Perspective"

Prof. Dr. Oded Cats (Delft University of Technology, TU Delft, Netherlands)

Oded Cats is Professor of Passenger Transport Systems at Delft University of Technology (TU Delft) in the Netherlands, and Head of its Department of Transport & Planning. He also serves as a Guest Professor at KTH Royal Institute of Technology, Stockholm. His work develops theory and models for multi-modal passenger transport networks integrating tools from behavioural science, operations research, and complex network theory. He co-leads the Smart Public Transport Lab, and his research spans topics such as assignment models, network design, system resilience, and resource allocation. He is the Principal Investigator of 3MARS, an ERC Consolidator Grant devoted to multi-modal long-distance transport and has also held an ERC Starting Grant, CriticalMaaS, devoted to double-sided mobility markets.

Keynote on Thursday 21st May:
"The future of European travel: is it on-track or derailed?"

Prof. Dr. Cathy Wu (Massachusetts Institute of Technology, MIT, USA)

Cathy Wu is Associate Professor in Civil and Environmental Engineering at MIT (also core faculty in the Institute for Data, Systems, and Society, and Laboratory for Information & Decision Systems). Her research lies at the intersection of machine learning, optimization, control theory and urban/transportation systems, with particular emphasis on mixed-autonomy mobility – i.e. how automation such as self-driving vehicles can be integrated into existing urban systems in ways that are efficient, safe and sustainable. She has been awarded major honors including the IEEE Intelligent Transportation Systems Best Dissertation Award, the NSF Career Award, among others, and works to develop computational tools and decision-support systems capable of scaling to societal challenges in mobility and infrastructure.

Keynote on Friday 22nd May:
"Tackling the Long Tail of Transportation Optimization with Machine Learning"

3.3 Industry Sponsors

We would like to use this opportunity to thank our generous industry sponsors of the conference.

Schweizerische Bundesbahnen (SBB | CFF | FFS)

Gold Sponsor (5,000 CHF)

Swiss Federal Railways is the national railway company of Switzerland. Founded in 1902 and headquartered in Bern, it is a state-owned enterprise regulated by public law. SBB operates the majority of the country's rail network and provides passenger and freight transport services through divisions such as Passenger, SBB Cargo, Infrastructure, and Real Estate. The company employs over 35,000 people and reported revenues exceeding CHF 11 billion in 2024. As a central pillar of Switzerland's public transport system, SBB plays a key role in national mobility and logistics, managing a highly integrated and densely used rail network.

Planzer Holding AG

Silver Sponsor (4,000 CHF)

Planzer Holding AG is a Swiss transportation and logistics company headquartered in Seewen, with operational headquarters in Dietikon near Zurich. Founded in 1936, the company is privately owned by the Planzer family and has grown into one of Switzerland's leading logistics providers. The company employs over 5,600 people and operates thousands of vehicles across a network of locations in Switzerland and internationally. Planzer offers services including freight transport, warehouse logistics, parcel delivery, and supply chain solutions, and generated revenues of over CHF 1 billion in recent years.

Die Schweizerische Post

Bronze Sponsor (2,000 CHF)

Swiss Post is the national postal service of Switzerland and a state-owned public limited company. Founded in 1849 and headquartered in Bern, it is one of the country's largest employers, with tens of thousands of employees.

The organization provides a wide range of services including letter mail, parcel delivery, logistics, financial services, and public passenger transport through its PostBus network. Swiss Post operates both domestically and internationally and generates annual revenues of over CHF 7 billion. It has been recognized multiple times as one of the world's leading postal services.

Repubblica e Cantone Ticino

Annual Sponsor (Conference Rooms at Monte Verità)

3.4 Time Schedule Overview

Wednesday, May 20th 2026

Time	Programme		
12:00 – 14:00	Registration & Sandwich Luncheon		
14:00 – 14:15	Opening Ceremony (Auditorium)		
14:15 – 15:15	Keynote 1: Prof. Dr. Yoram Shiftan (Auditorium)		
15:15 – 15:45	Coffee Break & Hotel Check-In		
15:45 – 17:00	**Session 1A (Auditorium)** ▪ A. Reiffer (#26) ▪ J. Meli (#29) ▪ F. Masse (#54)	**Session 1B (Balint)** ▪ T. Ramseier (#50) ▪ T. Hillel (#58) ▪ Q. Li (#31)	**Session 1C (Eranos)** ▪ L. Schwab (#44) ▪ M. Miotti (#55) ▪ G. Romera (#74)
17:00 – 17:15	Short Break		
17:15 – 18:30	**Session 2A (Auditorium)** ▪ B. Tomarchio (#14) ▪ A.V. Preto (#43) ▪ K. Riehl (#51)	**Session 2B (Balint)** ▪ L. Lallemand (#23) ▪ J. Haller (#34) ▪ M. Hassan (#73)	**Session 2C (Eranos)** ▪ H. Jiang (#18) ▪ X. He (#33) ▪ T. Cotti (#38)
18:30 – 19:15	Free Time		
From 19:15	Gala Dinner 1 (Grotto Baldoria)		

Thursday, May 21st 2026

Time	Programme		
07:30 – 09:00	Breakfast		
09:00 – 10:00	Keynote 2: Prof. Dr. Oded Cats (Auditorium)		
10:00 – 10:30	Coffee Break		
10:30 – 11:45	**Session 3A (Auditorium)** ▪ Y. Haghighi (#20) ▪ H. Kaufmann (#9) ▪ J. Roper (#47)	**Session 3B (Balint)** ▪ M. Balac (#37) ▪ S. Benzoni (#48) ▪ J. Gong (#75)	**Session 3C (Eranos)** ▪ K. Schimohr (#25) ▪ S. Raghavan (#42) ▪ J. Lordieck (#30)
12:00 – 13:30	Luncheon		
13:30 – 14:45	**Session 4A (Auditorium)** ▪ Y. Zolfimoselo (#66) ▪ R. Chen (#62) ▪ J. Laviolette (#41)	**Session 4B (Balint)** ▪ V. Dahmen (#35) ▪ R. Grimal (#39) ▪ V. Gerard (#69)	**Session 4C (Eranos)** ▪ J. Schlapbach (#10) ▪ C. Rames (#15) ▪ T. Janssen (#59)
14:45 – 15:15	Coffee Break		
15:15 – 16:55	**Session 5A (Auditorium)** ▪ B. Schmid (#11) ▪ B. Lindner (#6) ▪ A. Ancupane (#68) ▪ B. Avci (#65)	**Session 5B (Balint)** ▪ P. Vogler (#16) ▪ S. Ataç (#49) ▪ F. Rieg (#46) ▪ L. Sun (#24)	**Session 5C (Eranos)** ▪ A. Paulish (#17) ▪ Y.C. Ni (#28) ▪ I. Kaddoura (#8) ▪ O. Roman (#60)
17:15 – 17:30	Group Photo		
17:30 – 18:30	Committee Meeting (Eranos)		
17:30 – 19:15	Free Time + Optional: Guided tour through Monte Verità Museum (90mins)		
From 19:15	Gala Dinner 2 (Stalla Degli Angioli)		

Friday, May 22nd 2026

Time	Programme		
07:30 – 09:00	Breakfast		
09:00 – 10:15	**Session 6A (Auditorium)** ▪ J. Roth (#45) ▪ K. Axhausen (#7) ▪ J. Deng (#52)	**Session 6B (Balint)** ▪ V. Klasovita (#32) ▪ Y. Borhani (#67) ▪ L. Feng (#71)	**Session 6C (Eranos)** ▪ X. Wang (#13) ▪ D. Guggisberg (#56) ▪ Y. Gao (#72)
10:15 – 11:30	**Session 7A (Auditorium)** ▪ N. Ortelli (#40) ▪ J. Zheng (#53) ▪ L. Ambühl (#57)	**Session 7B (Balint)** ▪ C. Baud (#21) ▪ E. Brugger (#36) ▪ P.C. Luan (#70)	**Session 7C (Eranos)** ▪ G. Anagnostopols (#22) ▪ Z. Jia (#19) ▪ T.C. Ouyang (#27)
11:30 – 12:00	Coffee Break		
12:00 – 13:00	Keynote 3: Prof. Dr. Cathy Wu (Auditorium)		
13:00 – 13:30	Closing Ceremony		

3.5 Session Overview

Day: May 20	**Session: 1A**	**Room: Auditorium**	**Chair: Florian Masse**
15:45 - 16:10	Anna Reiffer (#26)	Accessibility and Grocery Shopping Travel Behavior of Individuals with Mobility Impairments: A Cross-City Analysis of four Cities	
16:10 – 16:35	Jonas Meli (#29)	The Influence of Perceived Accessibility on Mode Choice	
16:35 – 17:00	Florian Masse (#54)	What happens in between activities and intermodality	
Day: May 20	**Session: 1B**	**Room: Balint**	**Chair: Tim Hillel**
15:45 - 16:10	Ramseier Thomas (#50)	Study of congestion in a two-layer multiplex transportation network	
16:10 – 16:35	Tim Hillel (#58)	Integrating ordinal work-from-home choice into Switzerland's national Activity-Based Model	
16:35 – 17:00	Qiaosen Li (#31)	Antifragile Perimeter Control via Adversarial Reinforcement Learning	
Day: May 20	**Session: 1C**	**Room: Eranos**	**Chair: Laura Schwab**
15:45 - 16:10	Laura Schwab (#44)	Sustainable Corporate Commuting: Exploring Mode Choice and Policy impacts	
16:10 – 16:35	Marco Miotti (#55)	What spatial resolution and regional scope are required to quantify accessibility? A multi-scale approach and evaluation	
16:35 – 17:00	Gloria Romera (#74)	Connecting Disciplines for Impact: Opportunities for Collaboration at the Center for Sustainable Future Mobility	
Day: May 20	**Session: 2A**	**Room: Auditorium**	**Chair: Kevin Riehl**
17:15 - 17:40	Barbara Tomarchio (#14)	Stochastic routing optimization for organic waste collection	
17:40 – 18:05	Anne-Valerie Preto (#43)	Heterogeneity in Mobility Behavior: Latent Classes from Long-Term Tracking Data	
18:05 – 18:30	Kevin Riehl (#51)	Towards Fair Roads – Manifesto For Fair Traffic Engineering	
Day: May 20	**Session: 2B**	**Room: Balint**	**Chair: Mariam Hassan**
17:15 - 17:40	Louise Lallemand (#23)	New Formulation for the Choice-based Capacitated Line Planning Problem	
17:40 – 18:05	Jonas Haller (#34)	Infrastructural Violence as a Conflict Driver Re-evaluating Transport Security through a Peacebuilding Lens	
18:05 – 18:30	Mariam Hassan (#73)	State-of-the-art Text-to-Video (T2V) diffusion models	
Day: May 20	**Session: 2C**	**Room: Eranos**	**Chair: Tim Cotti**
17:15 - 17:40	Haoran Jiang (#18)	Two-stage optimization approach for dynamic routing and charging scheduling in electrified-autonomous flexible transit	
17:40 – 18:05	Xuan He (#33)	Using big data and deep learning to decode the links between shared e-bike travel behaviors and street environments in Seville, Spain	
18:05 – 18:30	Tim Cotti (#38)	Perceived Quality of Cycling Infrastructure at Intersections: A Stated Preference Analysis	
Day: May 21	**Session: 3A**	**Room: Auditorium**	**Chair: Josephine Roper**
10:30 – 10:55	Yasaman Haghighi (#20)	LayerSync: Self-aligning Intermediate Layers	
10:55 – 11:20	Heiner Kaufmann (#9)	Dancing with Uncertainty: A GenAI-Driven Approach to Robust Long-Term Planning at Swiss Federal Railways	
11:20 – 11:55	Josephine Roper (#47)	Multi-activity, multi-modal accessibility measures for Switzerland	
Day: May 21	**Session: 3B**	**Room: Balint**	**Chair: Stefano Benzoni**
10:30 – 10:55	Milos Balac (#37)	Agent-based transport model of Switzerland based on eqasim and MATSim	
10:55 – 11:20	Stefano Benzoni (#48)	Leisure Mobility in an Aging Population: Defining Destination Attractivity for Travel Demand Forecasting	
11:20 – 11:55	Jinrui Gong (#75)	Understanding User Acceptance of Autonomous Valet Parking: Insights from the extend UTAUT2 Framework	
Day: May 21	**Session: 3C**	**Room: Eranos**	**Chair: Jan Lordieck**
10:30 – 10:55	Katja Schimohr (#25)	Regulating Micromobility: Effects of Mandatory Parking Zones on E-Scooter Usage	
10:55 – 11:20	Shreyaa Raghavan (#42)	Robust Optimization for Closed-loop Calibration of Macroscopic Traffic Simulation	
11:20 – 11:55	Jan Lordieck (#30)	An operational perspective on criticality in railway delay propagation	

Day: May 21	**Session: 4A**	**Room: Auditorium**	**Chair: Jerome Laviolette**
13:30 – 13:55	Yasaman Zolfimoselo (#66)	Efficient Urban Traffic Monitoring via Coordinated UAVs: A Scalable Multi-Agent Framework	
13:55 – 14:20	Ran Chen (#62)	Macroscopic Fundamental Diagrams for Low-Altitude Air Transport with Velocity Heterogeneity Correction	
14:20 – 14:45	Jerome Laviolette (#41)	The impacts of e-bike acquisition on attitudes and travel behaviour – A longitudinal investigation using the Swiss Mobility Panel	
Day: May 21	**Session: 4B**	**Room: Balint**	**Chair: Valentin Gerard**
13:30 – 13:55	Victoria Dahmen (#35)	Sequence Effects in Bicycle Routes: Evidence from GPS Cycling Trajectories	
13:55 – 14:20	Richard Grimal (#39)	Modelling Transport-Related Socio-Economic Stress in Relation to Energy Costs: Choice of Indicators and Retrospective Analysis	
14:20 – 14:45	Valentin Gerard (#69)	MAD: Motion Appearance Decoupling for efficient Driving World Models	
Day: May 21	**Session: 4C**	**Room: Eranos**	**Chair: Tom Janssen**
13:30 – 13:55	Julius Schlapbach (#10)	A Standardized Python Framework for Comparing Macroscopic Traffic Flow Models Across Cities	
13:55 – 14:20	Clement Rames (#15)	Transition trajectories from 50 years of travel surveys	
14:20 – 14:45	Tom Janssen (#59)	The Impact of Model Mismatch on Trajectory Optimization and Autonomous Train Control	
Day: May 21	**Session: 5A**	**Room: Auditorium**	**Chair: Batuhan Avci**
15:15 – 15:40	Basil Schmid (#11)	Stated preference (SP) survey 2025 on mode, route and departure time choice	
15:40 – 16:05	Björn Lindner & Maike Scherrer (#6)	Smart Routes, Better Cities: Optimising Last-Mile Delivery for Environmental, Social, and Economic Impact	
16:05 – 16:30	Amelija Ancupane (#68)	Peak Pricing on Swiss Rail: From Departure-Time Choice Modelling to MATSim Simulation	
16:30 – 16:55	Batuhan Avci (#65)	Gaussian Processes for Real-Time Urban Traffic Estimation Using a Fleet of Drones	
Day: May 21	**Session: 5B**	**Room: Balint**	**Chair: Linghang Sun**
15:15 – 15:40	Prunelle Vogler (#16)	A Labeling Algorithm for the Single-Agent Scheduling and Routing Problem	
15:40 – 16:05	Selin Ataç (#49)	What makes cycling attractive in Yverdon-les-Bains? Willingness to detour for better routes	
16:05 – 16:30	Fabian Rieg (#46)	Operationalizing Future Mobility: A Morphological Scenario Analysis of Swiss Urban Transport 2050	
16:30 – 16:55	Linghang Sun (#24)	The effect of Tempo 30 on reducing traffic accidents	
Day: May 21	**Session: 5C**	**Room: Eranos**	**Chair: Orlando Roman**
15:15 – 15:40	Anna Paulish (#17)	Towards high-resolution, error-aware, spatiotemporal air quality modeling in urban environments	
15:40 – 16:05	Ying-Chuan Ni (#28)	BikeZ-ETH: Mass cycling flow experiments for trajectory data collection	
16:05 – 16:30	Ihab Kaddoura (#8)	The Impact of Operational Policies on Railway Infrastructure Capacity and Robustness	
16:30 – 16:55	Orlando Roman (#60)	Developing adaptive pathways for the planning of transport systems under uncertainty	
Day: May 22	**Session: 6A**	**Room: Auditorium**	**Chair: Jialin Deng**
09:00 – 09:25	Jakob Roth (#45)	Bicycle infrastructure in Bogotá: Effects on usage and welfare	
09:25 – 09:50	K. Axhausen (#7)	My path into a research career: Lessons learnt	
09:50 – 10:15	Jialin Deng (#52)	How HSR station areas reshape local residents' metro usage: Evidence from mobile phone data in Beijing	
Day: May 22	**Session: 6B**	**Room: Balint**	**Chair: Lan Feng**
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09:25 – 09:50	Yasamin Borhani (#67)	MoSoLoco: Monocular Socially-Aware Human 3D Localization From Images	
09:50 – 10:15	Lan Feng (#71)	RAP: 3D Rasterization Augemented End-to-End Planning	

Day: May 22	**Session: 6C**	**Room: Eranos**	**Chair: Yang Gao**
09:00 – 09:25	Xiaoyan Wang (#13)	Operational Feasibility of Autonomous Vehicle Crowdsourcing Service under Heterogeneous Travel Patterns	
09:25 – 09:50	Davi Guggisberg (#56)	Towards a Quantitative Spatial Model for Switzerland: Prototype Implementation and Lessons Learned from Ticino	
09:50 – 10:15	Yang Gao (#72)	Deformable Gaussian Occupancy: Decoupling Rigid and Nonrigid Motion with Factorized Distillation	
Day: May 22	**Session: 7A**	**Room: Auditorium**	**Chair: Jiemin Zheng**
10:15 – 10:40	Nicola Ortelli (#40)	The transfer penalty is (mostly) not about transfers: mode-specific discomfort in intermodal urban trips	
10:40 – 11:05	Jiemin Zheng (#53)	The Impact of Overtime Work and Built Environment on Workers' Daily Mobility and Well-Being	
11:05 – 11:30	Lukas Ambühl (#57)	Estimating Traffic Evaporation during Roadworks with a Simulation-Based Demand Model	
Day: May 22	**Session: 7B**	**Room: Balint**	**Chair: Po-Chien Luan**
10:15 – 10:40	Candice Baud (#21)	Synthetic panel generation using Bayesian simulation methods	
10:40 – 11:05	Elisabeth Brugger (#36)	Heuristic to propose Few Distinct Solutions to the Additional Train Scheduling Problem	
11:05 – 11:30	Po-Chien Luan (#70)	Consistent Navigation World Model	
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4. Contribution Abstracts

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#71	RAP: 3D Rasterization Augmented End-to-End Planning
#25	Regulating Micromobility: Effects of Mandatory Parking Zones on E-Scooter Usage
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#35	Sequence Effects in Bicycle Routes: Evidence from GPS Cycling Trajectories
#6	Smart Routes, Better Cities: Optimising Last-Mile Delivery for Environmental, Social, and Economic Impact
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#11	Stated preference (SP) survey 2025 on mode, route and departure time choice
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#59	The Impact of Model Mismatch on Trajectory Optimization and Autonomous Train Control
#53	The Impact of Overtime Work and Built Environment on Workers' Daily Mobility and Well-Being
#41	The impacts of e-bike acquisition on attitudes and travel behaviour – A longitudinal investigation using the Swiss Mobility Panel
#29	The Influence of Perceived Accessibility on Mode Choice
#40	The transfer penalty is (mostly) not about transfers: mode-specific discomfort in intermodal urban trips
#51	Towards Fair Roads – Manifesto For Fair Traffic Engineering
#17	Towards high-resolution, error-aware, spatiotemporal air quality modeling in urban environments
#56	Towards a Quantitative Spatial Model for Switzerland: Prototype Implementation and Lessons Learned from Ticino
#15	Transition trajectories from 50 years of travel surveys
#18	Two-stage optimization approach for dynamic routing and charging scheduling in electrified-autonomous flexible transit
#33	Using big data and deep learning to decode the links between shared e-bike travel behaviors and street environments in Seville, Spain
#75	Understanding Autonomous Valet Parking: Behavioral Responses and Policy Implications
#54	What happens in between activities and intermodality
#49	What makes cycling attractive in Yverdon-les-Bains? Willingness to detour for better routes
#55	What spatial resolution and regional scope are required to quantify accessibility? A multi-scale approach and evaluation

A Labeling Algorithm for the Single-Agent Scheduling and Routing Problem

(#16) Prunelle Vogler (EPFL,TRANSP,OR), Frédéric Meunier (EPFL,TRANSP,OR), Michel Bierlaire (EPFL,TRANSP,OR)

We study a single-agent routing and scheduling problem in which an agent must select both a path in a directed graph and a schedule—start times and durations at visited vertices corresponding to activities—to maximize utility. Unlike classical shortest path or resource-constrained shortest path problems, utility is not purely additive over arcs. In addition to travel-related rewards, it includes schedule preferences defined over continuous time variables—activity start times and durations, modeled as piecewise-linear functions. This non-additive and continuous component prevents the direct application of standard labeling algorithms. We propose a labeling algorithm that explicitly incorporates scheduling preferences by associating each label with a piecewise-linear utility function rather than a scalar value. This representation allows the algorithm to correctly propagate and compare partial paths while accounting for future scheduling decisions. Several dominance rules are introduced to prune dominated labels. We develop multiple algorithmic variants based on these dominance policies and conduct a computational comparison to assess their impact on label proliferation and solving time.

A Standardized Python Framework for Comparing Macroscopic Traffic Flow Models Across Cities

(#10) Julius Schlapbach (ETH,IVT,SVT), Krishna Kanth Vuppala Narasimha (ETH,IVT,SVT), Anastasios Kouvelas (ETH,IVT,SVT), Michail A. Makridis (ETH,IVT,SVT)

Macroscopic traffic flow models enable computationally efficient analysis of congestion at the city scale, yet their adoption for traffic management and research is often hindered by non-standard implementations and uncertainty about which formulation is appropriate for a given application. We present traffic flow models, a Python framework providing standardized implementations of several macroscopic models (including first- and second-order approaches such as CTM and METANET) through a common interface. The framework includes a SUMO-based calibration pipeline: users provide standard SUMO configuration files, the full network is simulated microscopically, and outputs are aggregated at link level to obtain macroscopic measurements (flows, densities, speeds, and travel times) for estimating model parameters and boundary conditions. For scenarios including surface roads, the pipeline can automatically extract highway corridors while representing surrounding urban areas through boundary demand profiles (e.g., on-ramp demand curves and off-ramp destination boundary conditions). Ongoing work applies the framework to multiple cities and scenario sets to compare model applicability and to identify network and demand characteristics that systematically favor specific macroscopic formulations.

Accessibility and Grocery Shopping Travel Behavior of Individuals with Mobility Impairments: A Cross-City Analysis of four Cities

(#26) Anna S. Reiffer (ETH,IVT,TMP), Eva Heinen (ETH,IVT,TMP)

Mobility and accessibility are fundamental to maintaining independence, yet individuals with mobility restrictions face persistent barriers that hinder essential activities such as grocery shopping. This study investigates how transport systems and urban form influence the perceived accessibility and travel behavior of mobility-impaired individuals across four European cities: Zurich, Paris, Dortmund, and Trondheim. Utilizing sample of 1,916 observations from a 2025 multi-city survey, we employ a Hybrid Choice Model to account for the latent attitudes that drive mode choice. The results highlight a significant disparity in perceived accessibility across all urban contexts, confirming that physical restrictions consistently degrade the psychological perception of the walking environment. However, the study finds that specific transport infrastructures and citylevel characteristics can serve as powerful moderators, either exacerbating or mitigating these barriers. By identifying how different urban transport systems successfully serve individuals with restricted mobility, this research provides insights into the design of inclusive cities. The findings suggest that achieving equitable urban mobility requires a nuanced understanding of the intersection between physical ability, subjective perception, and spatial planning.

Agent-based transport model of Switzerland based on eqasim and MATSim

(#37) Abdelkader Dib (ETH,CSFM), Aurore Sallard (ETH,IVT), Milos Balac (ETH,CSFM)

In this paper we will present the new open-source adaption of the eqasim pipeline to Switzerland to generate the synthetic population and their travel demand, its subsequent pairing with MATSim and

finally calibration procedures ensuring multi-criteria goodness of fit. Starting from the earlier implementation we make several improvements in all stages of the pipeline, brining new features, new data, better accuracy, forecasting capabilities and automated calibration. In the next steps the developed methodology will be applied to develop region-specific Swiss agent-based transport models together with cantonal authorities, public transport operators, and cities, directly linking state-of-the-art methods and planning needs.

An operational perspective on criticality in railway delay propagation

(#30) Jan Lordieck (ETH,IVT,TS), Matthijs Romeijnders,
Debabrata Panja, Francesco Corman (ETH,IVT,TS)

Recently, timeliness criticality—a phenomenon in schedule-based systems that leads to cascading delays—has been described theoretically (Moran et al., 2024) and empirically demonstrated in railway operations (Romeijnders et al., to be submitted). The latter study shows that railway systems exhibit a critical recovery rate. Here, the recovery rate is defined as the proportion of the total duration of an activity (running or dwelling) that is allocated to recovery time beyond the activity's minimum duration. Below and above this critical recovery rate, the system operates in two distinct phases, resulting in fundamentally different dynamics: frequent and large versus rare and delay limited propagation. Depending on the relative recovery rate, the system experiences so-called avalanches—outbursts of system-wide delay triggered by local incidents—of varying size and duration. This study analyses the criticality phenomenon from a railway operations perspective using two Swiss railway networks as case studies. We identify hotspots where initial delays trigger avalanches and examine how these propagate topologically through the network. We track the temporal evolution of avalanche sizes and quantify the contribution of different propagation mechanisms, including infrastructure conflicts and shared vehicle or staff resources. Spatially aware time-series clustering is employed to identify recurrent patterns leading to delays and associated passenger inconvenience. By doing so, we introduce a criticality-theory-based method for identifying robustness issues in railway operations and discuss how the implications of criticality can be addressed by railway operators.

Antifragile Perimeter Control via Adversarial Reinforcement Learning

(#31) Qiaosen Li (ETH,IVT,SVT), Michail A. Makridis (ETH,IVT,SVT),
Anastasios Kouvelas (ETH,IVT,SVT)

Urban traffic networks are increasingly exposed to rare but severe disruptions, such as infrastructure failures, sensor errors, and unexpected demand shocks, which can critically degrade traffic performance. This paper proposes an antifragile perimeter control framework based on adversarial reinforcement learning (ARL), aiming to enhance system performance under not only anticipated but also unforeseen disturbances. An adversarial agent is introduced to deliberately generate disruptions, targeting either the controller's input observations or the network infrastructure, thereby exposing the control policy to a wide spectrum of adverse conditions during training. Through this interaction, the perimeter controller learns a set of differentiated policies corresponding to varying disruption levels, rather than a single robust policy. In deployment, the controller dynamically selects and updates policies from this policy pool using posterior system information, enabling continual adaptation. The proposed framework shifts perimeter control from robustness to antifragility, allowing the system to improve through exposure to extreme events. The approach is validated using a microscopic simulation of the city of Zurich implemented in SUMO, demonstrating improved performance under both recurrent conditions and black-swan events.

Bicycle infrastructure in Bogotá: Effects on usage and welfare

(#45) Jakob Roth (UniBasel)

In light of rapid urbanization in Colombia, its capital, Bogotá, has built one of the world's largest connected cycling networks. This paper exploits the staggered construction of this network over the past 25 years to estimate its effects on the city and its residents. Using a series of household mobility surveys, I observe transport choices starting in 1995, before any bicycle infrastructure was present. I find that living within 400 m to the bicycle network tends to increase the probability of owning a bicycle and decreases the probability of owning a motorbike. Moreover, individuals living near bicycle lanes use bicycles more frequently. These effects are driven by considerable effect heterogeneity: young men and individuals without tertiary education respond most strongly. Using an alternative treatment definition, I show that a 10% increase in the overlap between the bicycle infrastructure and an individual's travel

needs raises the probability of making the trip by bicycle by about 0.1 percentage points (about 3%), on average.

BikeZ-ETH: Mass cycling flow experiments for trajectory data collection
(#28) Ying-Chuan Ni (ETH,IVT,SVT), Thomas Ramseier (ETH,IVT,SVT), Shaimaa K. El-Baklish (ETH,IVT,SVT), Kevin Riehl (ETH,IVT,SVT), Anastasios Kouvelas (ETH,IVT,SVT), Michail A. Makridis (ETH,IVT,SVT)

Bicycle traffic congestion is already evident in several major cities in the Netherlands and Denmark. However, in contrast to motor vehicle traffic, the dynamics of bicycle flow—at both microscopic and macroscopic levels — remain insufficiently understood, particularly in congested conditions. To address this gap, we present the BikeZ-ETH dataset, which comprises high-resolution cycling trajectories collected via drone-based observations from both naturalistic and controlled experiments at multiple locations in the city of Zurich, Switzerland. This work first introduces the field experimental design and the data post-processing pipeline. The dataset enables detailed analysis of bicycle flow efficiency and cycling behavior in various road environments. It also captures bi-modal interactions between bicycles and motor vehicles in mixed-traffic conditions. Leveraging empirical insights derived from the trajectory data, we further develop a SUMO-integrated traffic simulation API tailored for non-lane-based bicycle flow. The tool supports a wide range of applications, including bike lane network design, road space allocation, and multi-modal traffic control strategies.

Heuristic to propose Few Distinct Solutions to the Additional Train Scheduling Problem
(#36) Elisabeth Brugger (ETH,IVT,TS), Paola Pellegrini, Francesco Corman (ETH,IVT,TS)

As railway passenger demand rises and as timetables get tighter, the need for reliable additional train scheduling increases. While academic research has made progress in automating train scheduling, these advances often struggle to transfer directly into practice. One important issue is the objective function: studies typically simplify the problem to one to three objectives, but real-world deployments require many more to produce practically implementable solutions. Equally important is that many different factors influence whether a schedule is of high quality — not just whether the computed timetable is conflict-free. Understanding the trade-offs between these multiple objectives and how they shape the set of feasible solutions remains difficult. This work therefore aims to provide a small, carefully chosen set of distinct solutions that perform well across a range of relevant objectives. A framework using simulation, clustering, and a set covering problem is proposed to find solution clusters and their representative weight vectors. Then, a heuristic is proposed to calculate these few distinct solutions on new instances quickly. Fourteen corridors of the Swiss national railways are used as a test case. Two thousand instances per corridor are generated randomly with different weights of five objectives. Clustering allows to find between 1 and 9 solution clusters for all corridors. Cross-validation shows that the heuristic performs on average with 75% cluster coverage. The generalization of the approach over many railway corridors is thus promising.

Deformable Gaussian Occupancy: Decoupling Rigid and Nonrigid Motion with Factorized Distillation
(#72) Yang Gao (EPFL, VITA)

Understanding dynamic 3D environments is essential for safe autonomous driving, particularly when reasoning about human-centric, nonrigid agents. However, existing weakly supervised occupancy prediction frameworks predominantly assume rigid-body motion and rely on simple frame-to-frame offsets, limiting their ability to capture fine-grained deformations and maintain temporal coherence. To address this issue, we propose DeGO, a deformable Gaussian occupancy framework that unifies decoupled Gaussian deformation with factorized 4D foundation-model distillation. DeGO disentangles rigid and nonrigid motion, enabling each Gaussian primitive to evolve through both deformation and offset-based updates. In parallel, a factorized 4D distillation strategy transfers cross-camera and cross-frame knowledge from the VGGT foundation model, producing foundation-aligned features that enhance temporal consistency. Experiments on the Occ3D-NuScenes benchmark demonstrate that our method achieves state-of-the-art performance under weak supervision, delivering 13.5% gains on human-centric instances and 10.9% overall improvements. These results highlight the effectiveness of deformation-aware and foundation-guided occupancy modeling for dynamic scene understanding.

Consistent Navigation World Model

(#70) Po-Chien Luan (EPFL, VITA)

World models for action-conditioned visual prediction often rely on autoregressive rollout, which accumulates errors over time and produces future observations that are temporally inconsistent and weakly aligned with action-induced viewpoint changes. We present a unified framework that addresses these limitations through three coupled designs. First, we replace standard step-by-step rollout with an anchor-based inference strategy that predicts sparse future anchors and decomposes long-range prediction into shorter chunks. Second, we introduce a Bidirectional Chunked Diffusion Transformer (BC-DiT) that generates intermediate frames under both past and future conditions, improving temporal smoothness and action-conditioned consistency within each chunk. Third, we propose bidirectional epipolar masks that use correspondences from the observation and future anchor to impose geometry-aware cross-attention without requiring explicit 3D supervision. Together, these components reduce error accumulation, improve spatial grounding under ego-motion, and produce more coherent future visual predictions.

Connecting Disciplines for Impact: Opportunities for Collaboration at the Center for Sustainable Future Mobility (CSFM)

(#74) Gloria Romera Guereca (ETH, CSFM)

Research on transportation is evolving rapidly, with increasingly sophisticated methods, richer data, and growing computational capabilities. At the same time, many of the challenges facing future mobility extend beyond the scope of any single discipline or research group. As a result, relevant and promising knowledge, methods, and technologies often remain fragmented across research groups and institutional boundaries. The Center for Sustainable Future Mobility was established to address this fragmentation – not by replacing existing research, but by enabling coordination, shared infrastructure, and cross-disciplinary dialogue. This presentation introduces the Center's mission, thematic focus, and operating principles, with particular emphasis on how it supports researchers working on transport, mobility systems, behavior, digitalization, and policy. The talk clarifies what the Center can realistically offer – promote collaborative research, seed collaborations, and external visibility – and the different modalities of engagement. The goal of this session is to provide transparency about the Center's role within the research ecosystem and to identify potential points of alignment with ongoing and future research activities.

Dancing with Uncertainty: A GenAI-Driven Approach to Robust Long-Term Planning at Swiss Federal Railways

(#9) Heiner Kaufmann, Ihab Kaddoura, Thomas Hettinger, Merlin Unterfinger

In an era of rising volatility and profound uncertainty, decision-makers must make strategic choices that are robust across a spectrum of plausible futures rather than relying on point forecasts. For asset-heavy industries such as the Swiss Federal Railways, strategic decision making is shaped by long investment cycles and capital-intensive, long-lived assets, leading to decisions that remain consequential for decades. However, over the long term, factors such as demand, technology, and government regulations are not reliably predictable, creating a risk of misallocation and significant consequential costs. This paper presents a new GenAI-enabled pipeline that automates the construction of a scenario space and the selection of internally consistent scenarios. The GenAI system maps exogenous drivers to archetypal trajectories ranging from gradual to discontinuous and combines large language models with cross-impact balance analysis. The balancing algorithm reduces the combinatorial space of configurations to internally consistent and stable future scenarios. This pipeline has been successfully applied in various projects, for example, as part of a strategic project to plan the railway system for the year 2050. The paper outlines an extension of the pipeline that adds a strategic option space, enabling the application of robust decision-making and adaptive pathways methods to automatically generate robust strategies.

Developing adaptive pathways for the planning of transport systems under uncertainty

(#60) Orlando Roman (ETH,Constr.Infra.), Jin Rui Yap (ETH,Constr.Infra.),
Jan Kwakkel (ETH,Constr.Infra.), Bryan Adey (ETH,Constr.Infra.)

Planning transport systems to adapt to the future is challenging due to the complex interactions between transport, land use and the environment under uncertain future conditions. Such complex system

dynamics under uncertainty include unpredictable technological development, evolving trends in societal behaviours, and environmental change. When dealing with such deep uncertainty, planners should not aim to find an optimal solution for a single (i.e. most likely) scenario, instead, to find robust solutions, the ones that work adequately over many possible scenarios. The development of adaptive pathways (i.e., sequences of interventions that are triggered in response to the detection of signals of change) can help planners to explicitly include the ability to adapt over time, committing to short-term robust interventions and avoiding lock-ins that could prevent long-term adaptation. This paper proposes a methodology to integrate transport simulations to identify interpretable adaptive pathways through the use of sequential decision analytics (e.g., reinforcement learning and model-predictive control). We use the transport infrastructure planning in the Canton of Zurich, Switzerland as a case study. We generate a wide range of potential urban development scenarios by 2060 and a set of potential interventions in the system such as expansions in the road, railway and cycling network, improved multimodal infrastructure and other zoning and regulatory interventions. We evaluate conflicting planning goals such as reducing carbon emissions and increasing spatial accessibility. Urban development and macroscopic transport models are then coupled with analytical tools to investigate relevant system dynamics such as the main factors driving the achievement of specific planning goals and the scenarios that could be relevant for planning (e.g., vulnerabilities and opportunities). We also identify interventions that are robust (i.e., work well over most of the scenarios) and contingent (i.e., work well for specific scenarios). Finally, sequential decision analytics are used to search for the pathways (and visualised as policy trees) that best achieve planning goals.

Efficient Urban Traffic Monitoring via Coordinated UAVs: A Scalable Multi-Agent Framework

(#66) Yasaman Zolfimoselo (EPFL,LUTS), Maryam Kamgarpour (EPFL,LUTS), Nikolas Geroliminis (EPFL,LUTS)

As growing vehicle fleets increase urban congestion, CO2 emissions, and safety risks, real-time traffic monitoring has become critical for intelligent transportation systems. Traditional fixed sensors, such as loop detectors and cameras, are limited by spatial rigidity and significant coverage gaps. Coordinated Unmanned Aerial Vehicles (UAVs) provide a flexible alternative, offering spatially continuous monitoring across entire road segments. To maximize impact, monitoring must prioritize high-congestion zones while ensuring data freshness by minimizing observation latency across the network. Achieving this requires considering a history of recent UAV movements into the planning process to prevent redundant coverage and inefficient local oscillations. We model this system as a multi-agent Markov Decision Process (MDP) with a shared reward structure on a graph, where the state space is extended with a history of recent actions. In this graph, vertices represent intersections and edges denote road segments. While centralized control offers optimal coordination, it faces an exponential growth in state-space complexity that makes it intractable for large fleets. Existing works mostly rely on heuristically defined information embeddings and reward functions for deployment, yet the theoretical understanding of their efficiency remains limited. We propose a scalable multi-agent reinforcement learning algorithm to address the computational intractability issue and analyze its performance.

Estimating Traffic Evaporation during Roadworks with a Simulation-Based Demand Model

(#57) Matteo Felder (Transcality), Lukas Ambühl (Transcality), Henri Grossmann (Transcality), Timo Bundi (City of Zurich), Nicolas Gerig (Tiefbauamt Zürich), Marco Rothenfluh (VBZ)

Traffic “evaporation” commonly denotes the reduction in travel demand caused by capacity constraints such as roadworks. Similarly to induced demand, the phenomenon is widely documented but empirically hard to measure, since the observed traffic declines blend several influences, including seasonal variation, long-term trends, and route diversion. This study introduces a simulation-based methodology that isolates and realistically quantifies traffic evaporation by combining mesoscopic traffic simulation with endogenous demand estimation. Beginning from a calibrated base-year origin-destination (OD) demand model, the method infers successive demand states using detector data from pre-construction and construction periods. OD pairs are classified according to whether they are directly impacted by the work zone, allowing differentiated demand estimation in which unaffected relations act as a control group capturing seasonal and background demand changes. Route choice behavior is explicitly represented within the simulation, so that network-wide redistribution of flows is consistently modeled across scenarios. Traffic evaporation is then defined as the residual demand reduction for affected OD pairs after correcting for seasonal patterns and general demand evolution inferred from the unaffected control relations. All estimated demand states are constrained to share a single, coherent OD structure, while permitting demand levels to adapt endogenously to network changes. The approach is demonstrated

with real data for the city of Zurich, showing that it can disentangle evaporation from confounding effects and yield quantitative estimates suitable for planning, ex-post evaluation, and forecasting of construction impacts.

Exploring the Cost of Stability in Periodic Timetabling via Logic-Based Benders Decomposition

(# 27) Florian Fuchs (ETH,IVT,TS), Tongcheng Ouyang (ETH,IVT,TS),
Bernardo Martin-Iradi (ETH,IVT,TS), Francesco Corman (ETH,IVT,TS)

We present a novel microscopic timetabling and timetable decomposition framework to investigate the cost of periodic stability in relation to total travel time. Based on the existing Logic-Based Benders Decomposition (LBBD) approach for non-periodic microscopic timetabling with detailed infrastructure consideration, we extend the framework to microscopic periodic timetables with variable cycle times and a non-linear multi-objective formulation. This extension enables the simultaneous optimisation of cycle time and total travel time, allowing quantification of the costs of periodic stability. Within the LBBD framework, we generalise the original event-based cuts by introducing additional activity-based span cuts and mixed cuts. These cuts enable the efficient verification of feasibility for candidate cycle times and the identification of tight lower bounds on the cycle time. Once a feasible cycle time is identified, a second-stage optimisation reuses the LBBD framework to further optimise total travel time, thereby accelerating overall convergence. The proposed methods are validated on the Rhätische Bahn network, where a Pareto front is obtained that reveals non-trivial trade-offs between cycle time and total travel time and supports timetable design decisions. The analysis further provides insights into how the generalised decomposition methods improve computational performance and scalability.

Gaussian Processes for Real-Time Urban Traffic Estimation Using a Fleet of Drones

(#65) Batuhan Avci (EPFL,LUTS), Marko Susnjar (EPFL,LUTS),
Marko Maljkovic (EPFL,LUTS), Nikolas Geroliminis (EPFL,LUTS)

The growing deployment of Unmanned Aerial Vehicles (UAVs) in everyday applications opens new opportunities for real-time and high-resolution traffic monitoring. Using fleets of UAVs as mobile sensors offers many advantages over traditional fixed loop detectors, particularly in terms of flexibility and spatial coverage. However, since it is impossible to cover the whole city simultaneously, the desired information has to be extracted from the available current and previous observations. In this paper, we propose a a Gaussian process-based framework to model the spatial and temporal correlations between traffic parameters in the urban area. Gaussian processes are a Bayesian technique for estimation and data fusion, capable of estimating and propagating uncertainty, widely used in many data-driven scenarios. The area of interest is represented as a graph and we employ a graph Matérn kernel to capture the characteristics of the network. We evaluate the proposed method using both data collected from simulations and real-world measurements, demonstrating the effectiveness of Gaussian processes for traffic parameter estimation.

Heterogeneity in Mobility Behavior: Latent Classes from Long-Term Tracking Data

(#43) Anne-Valérie Preto (EPFL,TRANSP,OR), Andrea Schneider (SBB),
Michel Bierlaire (EPFL,TRANSP,OR)

Understanding mobility behavior requires going beyond mode choice and trip counts to capture how individuals structure their daily and weekly activities in time and space. Routine, flexibility, and variability in travel patterns influence public transport demand and peak congestion. We address this challenge by exploiting long-term passive tracking data from the Continuous Mobility Panel dataset, comprising approximately 2,000 individuals observed continuously between 2023 and 2025. We estimate a latent class model, with schedule indicators entering the measurement equations. The latent classes reveal distinct and interpretable mobility patterns, including routine schedule-constrained commuters, travelling salespeople with high work-related mobility, hybrid workers combining regular anchors with flexible schedules, and frequent international travelers. Rather than relying on a priori segmentation, class membership is inferred from observed mobility behavior. This framework allows the introduction of structural equations linking class membership probabilities to socio-economic characteristics. The results provide relevant insights for public transport planning. Class-specific demand profiles identify which user groups contribute to peak loads and which exhibit greater temporal or spatial flexibility, and are therefore more likely to adjust departure times or routes in response to crowding. Overall, the proposed latent class approach offers a behavioral alternative to traditional marketing personas,

enabling a deeper understanding of mobility routines and their implications for public transport system design and operation.

Including Uncertainties in Line Planning

(#32) Viera Klasovitá (ETH,IVT,TS), Micha Bigler, Francesco Corman (ETH,IVT,TS)

We study line planning in public transport under uncertain infrastructure, focusing specifically on capacity reductions on network links. To address these disruptions, we propose a two-stage stochastic optimisation framework that generates a first-stage line plan for the nominal network and scenario-dependent recourse plans that adapt to reduced capacities. To maintain operational consistency, the model incorporates replanning costs that discourage excessive deviations in frequency or lines between the nominal and disrupted plans. The objective combines passenger travel times, operator costs, and these deviation penalties, thereby balancing performance in undisturbed conditions with flexibility under infrastructure restrictions. We investigate how anticipating capacity restrictions influences the structure of first-stage line plans and how different representations of uncertainty, such as the magnitude and spatial distribution of capacity reductions, shape the trade-off between robustness and efficiency. The role of replanning costs is given some attention, as they determine the balance between adaptability in disrupted scenarios and the stability of the nominal line plan. We also assess the value of stochastic modelling relative to deterministic baselines and examine the computational implications of applying this framework to realistically sized networks.

Infrastructural Violence as a Conflict Driver Re-evaluating Transport Security through a Peacebuilding Lens

(#34) Jonas Haller (ETH,NADEL)

Conventional transport security paradigms often prioritize the "hardening" of infrastructure against asymmetric threats, viewing transit nodes as vulnerable "soft targets." This paper challenges that technocratic approach through a conflict-sensitive development lens, analyzing how security-driven urban design—specifically subterranean tunnels and bypass roads—functions as a mechanism of "vertical apartheid." Drawing on spatial analysis theories regarding the "politics of verticality," this study argues that in contested zones, transport networks are frequently engineered to enforce demographic segregation rather than facilitate connectivity. This creates a "Security Paradox": the infrastructural violence required to maintain separation inevitably sustains the very instability it seeks to mitigate, effectively freezing conflict into concrete. The paper proposes a paradigm shift in conflict management: moving from the segregation of "soft targets" to "Infrastructural Integration" as an active peace-building mechanism. By comparing the economic inefficiency of dual, segregated networks in Israel/Palestine against historical case studies of post-conflict integration (e.g. Northern Ireland, South Africa, US American South) the research validates an unexpected engineering solution. It posits that the most effective tool for conflict management is not militarized surveillance, but the rigorous dismantling of the exclusionary frameworks that necessitate it.

Integrating ordinal work-from-home choice into Switzerland’s national Activity-Based Model

(#58) Nicolas Salvadé (UCL), Antonin Danalet (SBB), and Tim Hillel (UCL)

This paper presents an enhanced work-from-home (WFH) model within Switzerland’s activity-based transport model (ActBM) SIMBA MOBi, developed by the Swiss Federal Railways (SBB). Our approach decomposes the decision to WFH within a possibility model (being allowed to work from home, a binary decision) and – newly – a propensity model, capturing frequency of WFH (as a percentage of total working time). Propensity to WFH is represented as an ordered logit. Methodologically, we make use of the piecewise linear RUMBoost choice model [2, 1], with a novel ordinal regression loss function. This approach combines the interpretability and behavioural consistency of random utility models with the flexibility and generalisability of ML approaches, allowing us to capture non-linear responses to socio-demographic, occupational, and accessibility variables. The WFH model is incorporated in the scheduling model of SIMBA MOBi, allowing for national scale simulation of daily activity patterns for different scenarios. We evaluate the model for long-term forecasting and for short-term disruption analysis. Specifically, we demonstrate its application in a real-world case: a rail line interruption between Fribourg and Bern, expected to increase WFH. Results highlight the importance of behaviourally rich WFH modelling for resilient transport planning under both structural change and temporary network disruptions.

LayerSync: Self-aligning Intermediate Layers

(#20) Yasaman Haghighi (EPFL,VITA), Alexandre Alahi (EPFL,VITA)

We propose LayerSync, a domain-agnostic approach for improving the generation quality and the training efficiency of diffusion models. Prior studies have highlighted the connection between the quality of generation and the representations learned by diffusion models, showing that external guidance on model intermediate representations accelerates training. We reconceptualize this paradigm by regularizing diffusion models with their own intermediate representations. Building on the observation that representation quality varies across diffusion model layers, we show that the most semantically rich representations can act as an intrinsic guidance for weaker ones, reducing the need for external supervision. Our approach, LayerSync, is a self-sufficient, plug-and-play regularizer term with no overhead on diffusion model training and generalizes beyond the visual domain to other modalities. LayerSync requires no pretrained models nor additional data. We extensively evaluate the method on image generation and demonstrate its applicability to other domains such as audio, video, and motion generation. We show that it consistently improves the generation quality and the training efficiency. For example, we speed up the training of flow-based transformer by over 8.75x on ImageNet dataset and improved the generation quality by 23.6%.

Leisure Mobility in an Aging Population: Defining Destination Attractivity for Travel Demand Forecasting

(#48) Stefano Benzoni (UZH), Antonin Danalet (SBB), Davi Guggisberg (HEIG-VD), Esra Suel

Population ageing and changing lifestyles are increasing the relevance of leisure travel. However, in many travel-demand models, leisure destination attractivity is represented by coarse and homogeneous proxies. This limits the ability capture heterogeneity across population groups and trip types. It also underuses increasingly rich geospatial data on leisure opportunities and environmental qualities. Our method represents destination attractivity at the zone level. We estimate a destination choice model based on travel survey data. Destination utility combines an accessibility component capturing travel impedance and an attractivity component capturing the pull of opportunities. The attractivity component is specified as a linear index of spatial indicators derived from official data and OpenStreetMap. These indicators capture urban and nature-based leisure opportunities (gastronomy, culture, outdoor amenities) and diversity/landscape measures. The framework supports segment-specific preferences. We demonstrate the approach with a Swiss case study using revealed leisure trips from the Mobility and Transport Microcensus (2015/2021). We estimate segment-specific preferences by age group (6–64 vs. 65+) and trip type (short vs. long). We observe distinct preference patterns across these segments. The resulting four attractivity values will be integrated into SIMBA MOBi (SBB's transport simulation model) and evaluated by comparing model outputs with observed destination and distance patterns.

Macroscopic Fundamental Diagrams for Low-Altitude Air Transport with Velocity Heterogeneity Correction

(#62) Ran Chen (EPFL,LUTS), Can Chen (EPFL,LUTS), Nikolas Geroliminis (EPFL,LUTS)

The rapid expansion of Low-Altitude Air Traffic (LAAT) necessitates robust macroscopic modeling tools to manage high-density urban drone operations and ensure system-wide safety. While the Macroscopic Fundamental Diagram (MFD) is a cornerstone of ground traffic management, conventional outflow models are insufficient for 3D multi-directional flight. Most of these models fail to account for velocity efficiency loss and path elongation caused by distributed collision avoidance maneuvers. To address this, we propose an MFD correction for LAAT systems that incorporates the statistical distribution of alongtrack velocity, defined as the velocity component projected toward the destination. Our formulation introduces the mean and variance of these along-track velocities into the corrected MFD, where the mean represents the effective contribution to destination progress and the variance represents speed heterogeneity. Through extensive simulations, we demonstrate that this corrected model significantly improves outflow estimation accuracy compared to baseline hydrodynamic relations. Notably, the corrective parameters remain invariant across varying operational constraints, including cruise speeds and average trip lengths. This invariance enables reliable real-time throughput estimation using only instantaneous kinetic data, offering a scalable framework for regional airspace capacity management and perimeter control.

MAD: Motion Appearance Decoupling for efficient Driving World Models
(#69) Valentin Gerard (EPFL,VITA)

Recent video diffusion models generate photorealistic, temporally coherent videos, yet they fall short as reliable world models for autonomous driving, where structured motion and physically consistent interactions are essential. Adapting these generalist video models to driving domains has shown promise but typically requires massive domain-specific data and costly fine-tuning. We propose an efficient adaptation framework that converts generalist video diffusion models into controllable driving world models with minimal supervision. The key idea is to decouple motion learning from appearance synthesis. First, the model is adapted to predict structured motion in a simplified form: videos of skeletonized agents and scene elements, focusing learning on physical and social plausibility. Then, the same backbone is reused to synthesize realistic RGB videos conditioned on these motion sequences, effectively "dressing" the motion with texture and lighting. This two-stage process mirrors a reasoning-rendering paradigm: first infer dynamics, then render appearance. Our experiments show this decoupled approach is exceptionally efficient: adapting SVD, we match prior SOTA models with less than 6% of their compute. Scaling to LTX, our MAD-LTX model outperforms all open-source competitors, and supports a comprehensive suite of text, ego, and object controls.

Modeling the dynamics of maneuver durations
(#22) Georg Anagnostopoulos (EPFL,LUTS), Nikolas Geroliminis (EPFL,LUTS)

Inspired by detailed urban traffic data, we propose a generalized lane-changing model in which maneuvers are treated as discrete choice events with continuous execution times. In our approach maneuver duration emerges endogenously from kinematic, behavioral, and maneuverability constraints. The model explicitly distinguishes between gap acceptance and collision avoidance depending on the type of interaction with neighboring agents, generating realistic, collision-free trajectories. Monte Carlo simulations recover the empirically established lognormal distribution of lane-changing durations, providing the first mechanistic explanation for its emergence and significantly outperforming alternative distributions. Moreover, lognormality of durations is not endemic to lane-changing but also governs lane-free maneuvers, suggesting a common underlying mechanism.

Modelling Transport-Related Socio-Economic Stress in Relation to Energy Costs: Choice of Indicators and Retrospective Analysis
(#39) Richard Grimal (France Matris)

This research displays a methodology to assess transport-related socio-economic stress, by simultaneously accounting for financial stress and travel restrictions among households. The cornerstone is a Tobit model of car travel needs, which is calibrated on French Household Travel Surveys, before using it to calculate the distribution of car travel needs through a Monte- Carlo simulation. The estimation of car travel needs allows us to estimate the frequency of car travel restrictions, indirectly revealing degrees of financial stress among households. These indicators are completed by an assessment of public transportation alternatives. Among our results, rising travel needs resulted in increasing the frequency of travel restrictions over the period 1994-2017, although their severeness is mitigated by public transportation alternatives, especially in large cities. The heterogeneity of supply reinforces the advantage of high-income groups through their ability to locate in central areas, allowing them to reduce their travel needs and decorrelate motility from the car. Transport-related socio-economic stress mostly concerns the lower half of the income distribution, corresponding to the poor and the lower middle class. In the end, we study the contribution of energy costs to these indicators, in a context characterized by recurrent social protests about fuel price rises.

MoSoLoco: Monocular Socially-Aware Human 3D Localization From Images
(#67) Yasamin Borhani (EPFL, VITA)

Accurate 3D human localization is crucial for safe robotic navigation, yet existing methods often rely on expensive LiDAR setups or computationally heavy multi-sensor pipelines. To address this, we present MoSoLoco, a lightweight framework for 3D human localization from monocular images. Our approach introduces a localization module that explicitly fuses geometric 2D skeleton keypoints with latent image features and multiagent social interactions, enabling 3D global position estimation from a single camera

view. To demonstrate the versatility of this multi-modal fusion, we evaluate it across both lightweight MLPbased and Transformer-based architectures, achieving consistent performance improvements. Experiments on the JRDB dataset demonstrate that MoSoLoco outperforms existing vision-based baselines in 3D human localization. Furthermore, we show that accurate 3D localization directly improves the performance of downstream trajectory forecasting tasks. MoSoLoco maintains robustness against degraded upstream 2D detections while preserving the computational efficiency required for edge-device robotic deployment.

Multi-activity, multi-modal accessibility measures for Switzerland

(#47) Josephine Roper (UZH), Xiang Han (UZH)

Swiss government bodies currently release a variety of accessibility measures, notably road network distance to services from populated hectares, ÖV Güteklassen which is based on frequency and type of public transport service, and a potential accessibility measure that considers the number of residents and jobs using road or public transport travel times, at a traffic zone scale. Notably missing is a measure of employment access alone, and any combination of access to services. We present a multi-activity accessibility measure calculated using the open-source THERE framework, incorporating distance decay and diminishing returns to multiple opportunities, at a high spatial resolution. We show how results differ from existing accessibility measures, for example highlighting differences between employment access by car and public transport, and provide a combined multiactivity measure weighted by current trip purposes. As a case study, we analyse the effects of temporary public transport timetable changes within the city of Zurich in 2026, showing how more complex measures can capture localised accessibility gains and losses, even where current measures of public transport frequency and road network distance remain the same.

Multi-depot battery electric bus scheduling and charging coordination under resource limitations

(#19) Zuoning Jia (Tongji), Kun An (Tongji)

Battery electric buses (BEBs) have gained significant popularity in metropolitan cities due to their environmental benefits. However, their limited range and long charging times pose challenges in optimizing vehicle scheduling and charging plans. To address these challenges, this study proposes a joint optimization model for BEB scheduling and charging across multiple lines and depots, incorporating charging infrastructure capacity constraints. The model employs a time-space network representation while innovatively eliminating vehicle-indexed variables, yet still accurately tracks state-of-charge (SOC) dynamics. We develop an adaptive large neighborhood search (ALNS) algorithm enhanced with two key sub-routines: (1) an SOC adjustment mechanism during the repair phase and (2) a charger/power allocation adjustment procedure. These sub-routines enable dynamic coordination between charging and scheduling decisions throughout the iterative optimization process. The proposed framework is validated using real-world operational data from Jiading District, Shanghai, China. Computational experiments demonstrate that our ALNS algorithm achieves an 88.7 % reduction in solution time compared to GUROBI for a 105-trip instance while maintaining solution quality. Moreover, the method scales effectively, solving a large-scale 460-trip scenario within 0.6 h.

New Formulation for the Choice-based Capacitated Line Planning Problem

(#23) Louise Lallemand (EPFL,TRANSP,OR), Léa Ricard (EPFL,TRANSP,OR), Michel Bierlaire (EPFL,TRANSP,OR)

Public transport network design plays a key role in shaping the efficiency, reliability and attractiveness of urban mobility systems. In this context, we investigate exact approaches for the capacitated Line Planning Problem (LPP) with decentralized passenger assignment. Given a graph of stations in an urban area and static information on the demand, we consider the problem of designing bus lines, so as to maximize passenger satisfaction under capacity constraints. Most exact models rely on simplified passenger assignment, in which paths are predetermined or uncapacitated. The more refined models are typically solved via heuristics, or by assuming cooperative followers to avoid bilevel complexity of user equilibrium. This paper introduces a new single-level formulation of the capacitated LPP, which accounts for disaggregated passenger behavior using discrete choice modeling and treats capacity constraints through an exogenous priority queue. A Monte Carlo sampling method is used to capture the stochastic component of the choice models. We then develop an exact resolution based on lazy-cut generations and explore acceleration techniques.

Operational Feasibility of Autonomous Vehicle Crowdsourcing Service under Heterogeneous Travel Patterns

(#13) Xiaoyan Wang (EPFL,HOMES), Kenan Zhang (EPFL,HOMES), Yaochen Ma (HKUST)

Autonomous vehicle (AV) crowdsourcing service involves the sharing of privately-owned AVs to serve other travelers during idle periods. Existing literature suggests that this business model holds potential benefits for travelers, AV owners, and the operator. Motivated by its promise, this paper investigates the operational feasibility of AV crowdsourcing service under heterogeneous travel patterns. We propose a modeling framework that simultaneously optimizes platform strategies across temporal and spatial dimensions. We then give a sufficient condition analytically where the operating platform will adopt the AV crowdsourcing services. After that, we test our model in a simple example, where there are residential area and commercial area for people's daily travels, and numerically check the impact of different travel patterns on the system. At last, we use Chicago city for a case study. Results offer practical guidelines for service operators to balance operation cost, rental payment and service efficiency through pricing and fleet relocation strategies, and provide insights to regulators on how people's travel behaviors will shape the future transport market in the era of autonomous driving.

Operationalizing Future Mobility: A Morphological Scenario Analysis of Swiss Urban Transport 2050

(#46) Fabian Rieg (UniSG)

Autonomous vehicles, digital platforms, and shared mobility modes are reshaping urban transport, outpacing traditional governance. The result is fragmented policy landscapes where cohesive long-term visions integrating these emergent technologies are lacking. While scenario planning methods exist, translating exploratory scenarios into operationalized policy frameworks with measurable targets remains challenging. To move beyond this fragmentation, this paper applies a morphological scenario analysis of Switzerland's urban mobility system toward 2050. Switzerland represents mature, multi-modal systems facing challenges common to advanced urban contexts. Drawing on 45 semi-structured expert interviews, sampled using the Triple Helix framework, we perform thematic analysis to identify key system dimensions. We structure findings within a morphological box supplemented by literature and generate divergent scenario narratives through internally consistent paths. Scenarios are refined and validated through multi-stage expert workshops involving both interview participants and independent domain experts. The paper delivers distinct scenarios for Switzerland's urban mobility system in 2050, illustrating divergent socio-technical futures. Furthermore, by operationalizing the identified system dimensions, we develop a performance indicator framework that enables authorities and organizations to construct and assess cohesive long-term visions based on measurable targets. While grounded in Switzerland, the methodological approach transfers to other mature multi-modal transport systems.

Peak Pricing on Swiss Rail: From Departure-Time Choice Modelling to MATSim Simulation

(#68) Amelija Ancupane (TU Delft)

Swiss rail is renowned for its ridership and quality, yet peak hours generate highly concentrated demand, placing pressure on the system and causing passenger discomfort. Peak pricing is an effective but underexplored demand management tool for Swiss rail. Since the policy aim is redistributing passengers rather than suppressing trips or shifting modes, departure-time choice is of central interest. This study uses data from a Swiss Stated Preference experiment to estimate a departure-time shift choice model, specified as a Multinomial Logit with terms for peak surcharge, schedule delay early and late, transfers, and crowding. Preliminary results show a preference for specific time periods, captured through peak, shoulder, and off-peak dummies as well as significance of sociodemographic interaction terms, such as household size with peak surcharge, education level with schedule delay late and more. Following steps involve integration of choice model results into SBB's agent-based model by adding disutility terms in the model's utility function with the estimated parameters differentiated across sociodemographic subgroups. Several peak pricing scenarios will then be tested in simulation. Beyond informing SBB and Swiss transport policy, the study aims to provide a methodological example of how rail peak pricing can be simulated in MATSim using choice modelling results.

Perceived Quality of Cycling Infrastructure at Intersections: A Stated Preference Analysis

(#38) Tim Cotti (FHNW), Alex Erath (FHNW), Michael van Eggermond (FHNW)

The understanding of cycling infrastructure perception is a critical factor in realizing the potential of bicycle use in Switzerland. Although about 70% of all bicycle accidents happen at intersections, little is know about the perceptions of cyclist of different intersection designs. This study investigates cyclists' preferences using a Stated Preference (SP) experiment in which more than 2,000 participants were presented with pairs of intersection scenarios, complemented by a complete avoidance option. To enhance realism, the experiment employed 3D visualisations of intersections. Participants were reuired to make trade-offs between design features and travel time. Responses were analysed using a Multinomial Logit model. The responses indicate a clear preference for intersections equipped with traffic lights and protected cycling facilities. In contrast, large road widths and high volumes of motorized traffic are perceived as major deterrents. While roundabouts and T-junctions are generally evaluated positively, complex manoeuvres, such as left turns, substantially reduce the perceived quality of the route over an intersection. The results are suitable for integration into the representation of road networks in travel demand models, enhancing route and mode choice modeling.

RAP: 3D Rasterization Augemented End-to-End Planning

(#71) Lan Feng (EPFL, VITA)

Imitation learning for end-to-end driving trains policies only on expert demonstrations. Once deployed in a closed loop, such policies lack recovery data: small mistakes cannot be corrected and quickly compound into failures. A promising direction is to generate alternative viewpoints and trajectories beyond the logged path. Prior work explores photorealistic digital twins via neural rendering or game engines, but these methods are prohibitively slow and costly, and thus mainly used for evaluation. In this work, we argue that photorealism is unnecessary for training end-to-end planners. What matters is semantic fidelity and scalability: driving depends on geometry and dynamics, not textures or lighting. Motivated by tis, we proposed 3D Rasterization, which replaces costly rendering with lightweight rasterization of annotated primitives, enabling augmentations such as counterfactual recovery maneuvers and cross-agent view synthesis. To transfer these synthetic views effectively to real-world deployment, we introduce a Raster-to-Real feature-space alignment that bridges the sim-to-real gap in the feature space. Together, these components form the Rasterization Augmented Planning (RAP), a scalable data augmentation pipeline for planning. RAP achieves state-of-the-art closed-loop robustness and long-tail generalization, ranking 1st on four major benchmarks: NAVSIM v1/v2, Waymo Open Dataset Vision-based E2E Driving, and Bench2Drive. Our results show that lightweight rasterization with feature alignment suffices to scale E2E training, offering a practical alternative to photorealistic rendering.

How HSR station areas reshape local residents' metro usage: Evidence from mobile phone data in Beijing

(#52) Jialin Deng (Ghent University), Eva Heinen (ETH,IVT,TMP),
Xuan He (ETH,IVT,TMP), Long Cheng (Ghent University), Frank Witlox (Ghent University)

High speed rail (HSR) station areas have emerged as key nodes in urban systems, yet whether they function as integrated urban places for nearby residents remains unclear. This study examines the realized place function of the Beijing South Railway Station (BJS) area by analyzing residents destination patterns using large scale mobile phone signaling data. Based on approximately 197,000 residents within a 4 km catchment, origin destination (OD) flows are constructed and distinguished into commuting and non commuting trips. First, the spatial structure of flows is analyzed to reveal how station area residents are connected to diffe rent urban functional zones. Second, a spatial interaction model is employed to assess how built environment characteristics at both origins and destinations shape the distribution of flows. The results provide behavioral evidence on whether opportunities created by HSR led development are effectively utilized in daily life. By shifting the node place framework from a supply side evaluation to a demand side perspective, this study contributes to a more nuanced understanding of how station areas are integrat ed into the broader urban system. The findings offer important implications for planning strategies aimed at enhancing the functional integration of HSR station areas.

Regulating Micromobility: Effects of Mandatory Parking Zones on E-Scooter Usage

(#25) Katja Schimohr (ETH,IVT,TMP), Xuan He (ETH,IVT,TMP), Eva Heinen (ETH,IVT,TMP)

In response to parking issues associated with free-floating e-scooter sharing systems, cities are increasingly implementing regulatory policies. So far, however, it remains unclear whether parking policies change how e-scooter sharing is used and integrated in urban transport systems. This study presents one of the first approaches to investigate the effects of such policies on e-scooter usage patterns. In the city center of Hannover, Germany, e-scooter parking has been limited to designated parking zones, moving away from a truly free-floating sharing system. We analyze a dataset of more than 1 million e-scooter trips provided by one operator, covering a time frame of 8 months before and after the introduction of parking regulations. This study investigates changes in user behavior using descriptive statistics and regression discontinuity analysis. The results demonstrate that the parking restrictions are not only effective in preventing e-scooter clutter in public spaces but also increase trip distances and durations. These changes could suggest a shift towards more sustainable mode use, where e-scooters do not replace short walking trips but are used for more substantial travel distances. The findings of this study can offer evidence-based guidance to cities planning to implement e-scooter parking regulations.

Robust Optimization for Closed-loop Calibration of Macroscopic Traffic Simulation

(#42) Shreyaa Raghavan (MIT), Cameron Hickert (MIT), Cathy Wu (MIT)

Accurate calibration of macroscopic traffic flow models such as METANET is critical for reliable prediction and downstream control. Standard offline calibration produces a static parameter set, yet we show that such solutions can be fragile: small perturbations in boundary inflows and floating-point errors can trigger unstable simulated dynamics and degraded predictions. We provide theoretical insight into this behavior, demonstrating that conventional objectives can select parameters that are locally optimal and within nominal bounds while exhibiting poor robustness to boundary disturbances. Motivated by this, we propose robust closed-loop calibration in which parameters are updated dynamically and computed to be robust to noise in the data. We model inflow disturbances as Gaussian noise and, at each rolling-horizon update, choose parameters that minimize the worst-case calibration error across a batch of sampled noisy inflows, with a penalty limiting step-to-step parameter changes. Optimizing each update against worst-case inflow perturbations yields parameter trajectories that generalize across plausible boundary realizations rather than overfitting to a single data instance. Experiments show that our methodology yields more stable simulations on real data and consistently better predictive accuracy under inflow perturbations than conventional static calibration.

Sequence Effects in Bicycle Routes: Evidence from GPS Cycling Trajectories

(#35) Victoria Dahmen (TUM), Ayda Grisiute (ETH,Cartography),
Martin Raubal (ETH,Cartography), Klaus Bogenberger (TUM)

As cycling is actively promoted and cities aim to improve cycling infrastructure, safety and comfort (Buehler and Dill, 2016), it is not only relevant which routes cyclists take, but also where along those routes they would most value improvements. The success of such measures ultimately hinges on human factors, such as perception and cognitive biases (Adam, 2026; Grisiute and Raubal, 2024). Bicycle route choice has been studied extensively, yet sequence effects, i.e., the order in which spatial properties are encountered along a route, have received little attention so far. Recent work (Abenoza et al., 2019) has suggested their relevance though; hence, in this research we utilize bicycle trajectory data from Zurich and Munich to investigate whether such sequence effects observed in a controlled lab experiment are also present in real-world data. We consider different route segmentation strategies to derive meaningful sequences. By assessing route deviations from the shortest routes, we uncover the cyclists' bias towards specific segment sequences. The experimental patterns are present to varying extents in real-world cycling trajectories. The observed behavioural patterns can be leveraged to support planning policies for allocating road space to bike lanes where their position along common routes improve the cycling experience the most.

Smart Routes, Better Cities: Optimising Last-Mile Delivery for Environmental, Social, and Economic Impact

(#6) Björn Lindner (Planzer Logistics), Maike Scherrer (ZHAW)

How can rigorous scientific insight truly shape the logistics systems of tomorrow—and how can real-world implementation, in turn, enrich academic discourse? Drawing on the experience of Planzer, the keynote speech demonstrates how research is translated into practical applications—and how insights gained from implementation are systematically fed back into the scientific community. This continuous exchange is key to designing last-mile logistics systems that are not only efficient, but also environmentally and socially sustainable. Through a series of compelling case examples, the keynote will illustrate what the supply of future urban spaces could look like. Grounded in robust theoretical frameworks, multiple pilot projects are conducted, analysed, and critically evaluated. Among the central questions addressed are:
- At which stages of the last mile does the deployment of autonomous vehicles make sense from both efficiency and sustainability perspectives?
- Which delivery vehicle types are best suited for specific urban environments in terms of delivery performance and urban compatibility?
- How can cities and delivery fleets be parameterised to minimise total distance travelled while ensuring reliable next-day delivery?
- And how can real-time dynamic route optimisation further enhance operational performance?
By bridging analytical rigor with practical experimentation, this keynote offers valuable insights into current challenges and future opportunities in urban logistics. It invites scholars to engage with a forward-looking perspective on how collaborative knowledge creation can shape the next generation of sustainable delivery systems and invites interested scholars to contribute with their thoughts to shape the future of logistics even further.

State-of-the-art Text-to-Video (T2V) diffusion models

(#73) Mariam Hassan (EPFL, VITA)

State-of-the-art Text-to-Video (T2V) diffusion models can generate visually impressive results, yet they still frequently fail to compose complex scenes or follow logical temporal instructions. In this paper, we argue that many errors, including apparent motion failures, originate from the model's inability to construct a semantically correct or logically consistent initial frame.We introduce Anchored Video Generation (AVG), a modular pipeline that decouples these tasks by decomposing the Text-to-Video generation into three specialized stages: (1) Reasoning, where a Large Language Model (LLM) rewrites the video prompt to describe only the initial scene, resolving temporal ambiguities; (2) Composition, where a Text-to-Image (T2I) model synthesizes a high-quality, compositionally-correct anchor frame from this new prompt; and (3) Temporal Synthesis, where a video model, finetuned to understand this anchor, focuses its entire capacity on animating the scene and following the prompt. Our approach sets a new state-of-the-art on the T2V CompBench benchmark and significantly improves all tested models on VBench2. Furthermore, we show that visual anchoring allows us to cut the number of sampling steps by 70% without any loss in performance. AVG offers a simple yet practical path toward more efficient, robust, and controllable video synthesis.

Stated preference (SP) survey 2025 on mode, route and departure time choice

(#11) Basil Schmid (ARE), Sylvie Gayda (STRATEC), Mathilde Ruyssen (STRATEC), Nicolas Moreau (STRATEC), Pauline Quittelier (STRATEC), Marco Kouwenhoven (Significance), Jeroen Muller (Significance), Rodrigo Tapia (Significance), Michel Bierlaire (EPFL,TRANSP,OR), Nicole Mathys (ARE)

As part of the Swiss Mobility and Transport Microcensus (MTMC) 2025, Switzerland's representative travel survey that is conducted every five years, an SP-survey on mode, route and departure time choice was conducted for a subsample of 6’235 respondents. The aim is to provide an empirical basis for the Swiss national transport model (NPVM), the transport perspectives (VP) as well as the value of time studies to update the cost-benefit norms. The SP-tasks are personalized for each respondent based on a revealed preference (RP) trip observed in the MTMC. Given the major changes and improvements in the design process making the survey behaviorally more realistic, this paper compares the main response figures and summary statistics of the underlying MTMC RP reference trips with the previously conducted SP-surveys from 2010, 2015 and 2021. Furthermore, several rules and data checks are investigated regarding the quality of responses, including non-trading behavior, response time and

lexicographic preferences. Based on these findings, respondents exhibiting a problematic or non-plausible response pattern are excluded from the final dataset. Finally, preliminary discrete choice models are presented to investigate the trends in attribute sensitivities, including the values of travel time (VTT).

Stochastic routing optimization for organic waste collection

(#14) Barbara Tomarchio (EPFL,TRANSP,OR & HES-SO), Sacha Varone (HES-SO), Léa Ricard (EPFL,TRANSP,OR), Michel Bierlaire (EPFL,TRANSP,OR)

We present a variant of the Vehicle Routing Problem (VRP) that integrates waste quality considerations into the routing solution. This new problem arises from a real-world application: the collection of organic waste containers. The quality of each container is determined by its quantity of organic and inorganic waste, the latter resulting from inadequate sorting practices. If the quality of the waste is sufficient, it can be taken to a recycling facility; otherwise, it must be taken to an incinerator. The quantity and quality of waste in each container are modeled as stochastic variables because they are unknown prior to collection. We present a formulation of this new routing problem that incorporates two expected cost terms in the objective function to capture its stochastic nature. The first component is the expected route failure cost, which represents the cost incurred when vehicles are unable to service containers due to insufficient capacity on scheduled trips. The second component is the expected unloading alternation cost, which reflects the cost incurred when vehicles must change the designated unloading facility as a result of deviations in waste quality from the planned routes. Through simulations, we observe that integrating expected costs in the stochastic formulation outperforms the deterministic formulation.

Study of congestion in a two-layer multiplex transportation network

(#50) Thomas Ramseier (ETH,IVT,SVT), Anastasios Kouvelas (ETH,IVT,SVT), Michail A. Makridis (ETH,IVT,SVT)

Transportation science has until recently extensively studied congestion propagation in singlelayer networks, where one-mode of transportation, cars usually, is considered. This representation of transport flows, may be accurate in car-centric cities, but falls short in cities with high bicycle usage for example. In such scenarios, the coupling of car and bicycle flows can be crucial to grasp the interaction between both modes and study their effect on the total efficiency of the multilayer transport network. This study shows preliminary results on the modeling of congestion in a two-layer multiplex network, where each layer represents one mode respectively (cars or bicycles). The two networks overlap on links (representing roads), where no bicycles lanes are present, which leads the two-modes to share the road space at those locations. The two transportation networks are modeled as random planar networks with various degree of overlap and represent an urban setting. The microscopic traffic simulations are done using the open-source software SUMO. The influence on the efficiency of the total network of the degree of overlap of the networks, free-flow velocity ratio between the two modes and mode share is discussed.

Sustainable Corporate Commuting: Exploring Mode Choice and Policy impacts

(#44) Laura Schwab (UniBasel)

Commuting-related externalities remain large because first-best Pigovian transport pricing is often politically or administratively infeasible. Large employers offer a promis-ing second-best lever to influence daily travel behavior. This study analyzes commuting mode choice at a multinational firm in Switzerland using a revealed-preference panel of 8,485 employees observed over nine months. Mixed multinomial logit models for car, public transport, and bicycle commuting reveal modest values of travel time savings and substantial heterogeneity across indi-viduals. Car use is more likely among cross-border commuters, shift workers, women, and employees over 45, while higher education is associated with lower car reliance. Policy simulations show that both higher parking fees and subsidies for sustainable modes are highly effective in reducing car commuting. Overall, the results highlight the potential of employer-based transport policies as an effective complement to public regulation in reducing commuting-related external costs.

Synthetic panel generation using Bayesian simulation methods

(#21) Candice Baud (EPFL,TRANSP,OR), Michel Bierlaire (EPFL,TRANSP,OR)

Activity-based models (ABMs) rely on population data to simulate individual behavior. However, such data is often limited due to sparse collection and privacy concerns, particularly in sensitive datasets gathered through censuses. Existing methods for generating synthetic populations rely on machine learning techniques, which require training on available data, or model-based approaches that employ alternating projections and resampling to adjust individual characteristics to fit new datasets. Population forecasts are then derived from demographic projections, accounting for factors such as fertility and mortality rates. However, those techniques don't enable to track individuals over multiple time periods. In this work, we propose a novel methodology for generating panel data by defining time-independent variables from which time-specific populations can be derived. These variables can be sampled from prior distributions calibrated on demographic models, and be combined with cross-sectional data measurement to adjust the distributions to the most current available information. The strength of this approach lies in its ability to create panel data for individuals from cross-sectional snapshots, making it a valuable tool for improving the precision of ABMs in areas where longitudinal data is scarce or difficult to obtain.

The effect of Tempo 30 on reducing traffic accidents

(#24) Linghang Sun (ETH,IVT,SVT), Anastasios Kouvelas (ETH,IVT,SVT),
Michail A. Makridis (ETH,IVT,SVT)

Traffic accidents cause great monetary and non-monetary loss to the whole society, and the development of modern society calls for safer, more sustainable, and more livable cities. In accordance with the EU's Vision Zero safety target, traffic fatalities and severe injuries should be minimized as close to zero as possible by 2050. Several countermeasures and policies can be implemented to achieve such goals. Many major cities around Europe have been experimenting with reducing the speed limit for motorized vehicles, such as the Tempo 30 regulation in Zurich. In this study, we systematically analyzed the effect of Tempo 30 on minimizing traffic accidents in Zurich. Multiple longitudinal data sources including loop detector data, registered accident log, and speed limit maps have been leveraged. In addition, an annual average daily traffic propagation algorithm is developed based on the Dirichlet graph, to bridge the gap between spatially complete but temporally incomplete data as well as temporally complete but spatially incomplete data. Instead of a simple before-after study, we applied empirical Bayesian as a statistical approach to gauge the effect of speed limit reductions. Results validated the effectiveness of the Tempo 30 regulation based on the case study of Zurich.

The Impact of Model Mismatch on Trajectory Optimization and Autonomous Train Control

(#59) Tom Janssen (ETH,IVT,TS)

In order to improve railway capacity, reduce energy consumption, and enable advanced concepts such as virtual coupling, future railway systems increasingly rely on autonomous train control. Such systems typically consist of a motion model used for trajectory optimization, followed by closed-loop trajectory tracking based on the same or a related model. While trajectory optimization, controller design, and model calibration are all well studied in isolation, their interaction under inevitable model mismatch and disturbances remains underexplored. This raises the fundamental question of how model mismatch and disturbance propagate through the full control stack, and to what extent closed-loop control mitigates the impact of model mismatch on downstream performance. This work investigates the influence of model mismatch and disturbances on key performance indicators such as energy consumption and tracking accuracy. By systematically varying model mismatch and disturbance levels in simulation, we analyze the sensitivity of trajectory optimization and closed-loop execution to imperfect models. The results provide quantitative insights into the trade-offs between calibration accuracy, optimization performance, and closed-loop robustness, and help clarify when improved calibration yields meaningful system-level benefits.

The Impact of Overtime Work and Built Environment on Workers' Daily Mobility and Well-Being

(#53) Jiemin Zheng (HKPU), Yuting Hou (HKPU),
Jérôme Laviolette (ETH,IVT,TMP), Eva Heinen (ETH,IVT,TMP)

Amid escalating work hours and the global normalization of overtime, concerns about its detrimental impacts on well-being are growing. However, the complex interplay between overtime work, the built environment, travel behavior, and well-being remains poorly understood. While extensive research has shown that built environment factors significantly influence travel behavior and subjective well-being, most studies implicitly assume standard work schedules and overlook overtime as a critical temporal

constraint. Drawing on time geography and environmental stress theory, this study fills this gap by proposing and testing a conceptual model in which daily mobility serves as a mediating mechanism, transmitting the effects of both overtime work and the built environment to subjective well-being. The model further posits that the built environment moderates the impact of overtime on mobility, thereby indirectly influencing well-being. Using survey data from Hong Kong—a city with a pervasive overtime culture—structural equation modeling (SEM) is employed to examine the direct and indirect effects of overtime work, the built environment, and daily mobility on subjective well-being. The findings will provide empirical evidence to support more equitable urban planning and transport policies that explicitly account for the distinct temporal and spatial needs of overtime workers.

The Impact of Operational Policies on Railway Infrastructure Capacity and Robustness

(#8) Merlin Unterfinger (SBB), Thomas Hettinger (SBB), Ihab Kaddoura (SBB), Nicolas Dulex (SBB),, Thomas von Brunn (SBB), Thomas Girnau (SBB)

In this study, the open-source railway simulation module railsim, an extension of the MATSim (Multi-Agent Transport Simulation, www.matsim.org) framework, is used to investigate the operational performance and capacity of critical infrastructure. We conducted simulation experiments for two use cases, each evaluated through different building blocks representing specific track topology variants: (i) a station with one, two, or three tracks per direction, and (ii) a crossing comparing a flat and a grade-separated layout. The study identifies infrastructure capacities for varying product mixes and traffic flow patterns. Our methodology employs Monte Carlo simulations with stochastic departure sampling. Results reveal that the point of system failure is heavily influenced by the heterogeneity of product mixes, highlighting the performance gap between synchronized metro-like systems and diverse mixed-traffic operations, as well as stopping frequency. These findings provide crucial insights into complex railway interactions, supporting strategic planning by identifying the specific thresholds where layout upgrades are required to ensure network performance, resilience and adequate timetable flexibility for the long-term.

The impacts of e-bike acquisition on attitudes and travel behaviour –
A longitudinal investigation using the Swiss Mobility Panel

(#41) Jérôme Laviolette (ETH,IVT,TMP), Eva Heinen (ETH,IVT,TMP)

E-bike ownership is rising across Europe, including in Switzerland. E-bikes can increase active travel among diverse populations by overcoming many barriers of traditional bicycles: long distances, hilly terrain, physical effort, poor health, carrying cargo or children. Their potential contribution to a low-carbon mobility transition depends on the extent to which e-bike trip replaces car trips. Evidence suggests substitution effects occurs, with level varying by on local and individual context as well as baseline travel behaviour. One aspect that has received less attention is the relationship between e-bike acquisition and cycling attitudes. Do people who acquire an e-bike already hold positive attitudes toward cycling? Do cycling attitudes become more positive after acquiring an e-bike? How do e-bike usage patterns moderate these changes? Which other characteristics might affect them? This fits within the broader ongoing conversation about the relationship between attitudes and travel behaviour: which one changes first? Understanding the processes of change has important implications for designing effective policies to increase e-bike adoption and use. Using multiple waves of the Swiss Mobility Panel between 2020 and 2025, we examine the relationship between changes in travel behaviour and cycling and car attitudes before and after e-bike acquisition.

The Influence of Perceived Accessibility on Mode Choice

(#29) Jonas Meli (ETH,IVT,TMP)

Railway expansion is an effective but often costly approach to increasing the attractiveness of public transportation. In the past, station accessibility has been identified as an alternative approach to increase public transportation ridership. However, the extent to which station accessibility influences mode choice remains unclear. In this study, we use 2,173 observations from stated-choice data collected by the Swiss Mobility Panel. To reflect station accessibility, we include data on individuals' perceived station accessibility by walking and by public transportation. We use discrete choice models to estimate the effects of perceived station accessibility on mode choice. We find that perceived station accessibility by walking has the highest average contribution to the utility of walking to the station and then taking the train. Our findings also suggest that the influence of perceived station accessibility by walking is more substantial than the effect of perceived station accessibility by public transportation. In

general, these results highlight that perceived station accessibility plays a key role in influencing mode choice.

The transfer penalty is (mostly) not about transfers: mode-specific discomfort in intermodal urban trips

(#40) Nicola Ortelli (Transports Publics Genevois), Florian Masse (Transports Publics Genevois), Emmanuel Ravalet (Bureau Mobil'homme), Vincent Kaufmann (EPFL,UrbanSociology), Daniel J. Reck (Transports Publics Genevois)

Besides additional walking and waiting times, transfers in multimodal urban transportation networks involve an additional penalty associated with the inconvenience of interrupting one's trip. This value, referred to as the pure transfer penalty (PTP), has received an increasing amount of attention in the recent literature (e.g., Garcia-Martinez et al., 2018; Jara-Diaz et al., 2022; Yap et al., 2024) due to its importance in the design of efficient transit, as well as in the development of realistic agent-based simulation models. In this study, we analyze data from a new stated-preference route-choice survey conducted in Geneva, Switzerland, in 2025. Building on previous work, the survey design allows the estimation of inconveniences associated with individual transport modes; this enables a more detailed decomposition of the PTP into multiple components related to transfer attributes and traveler characteristics, thereby treating the PTP less as a single, irreducible constant and more as a residual that can be progressively explained as richer explanatory variables are collected. We develop a series of logit models under different specifications, incorporating socioeconomic characteristics and random panel effects to account for observed and unobserved heterogeneity among respondents. The estimated PTPs are discussed in relation to findings in the existing literature.

Towards Fair Roads – Manifesto For Fair Traffic Engineering

(#51) Kevin Riehl (ETH,IVT,SVT), Anastasios Kouvelas (ETH,IVT,SVT), Michail A. Makridis (ETH,IVT,SVT)

Traffic engineering aims to control infrastructure and population behaviour to achieve optimal usage of road networks. Fairness is fundamental to stimulate cooperation in large populations, and plays an important role in traffic engineering, as it increases the well-being of users, improves driving safety through rulecompliance, and overcomes public resistance at legislative implementation. A systematic review of the literature highlights that only a few works have translated fairness into traffic engineering and control, contrary to the domain of longterm transport planning. Moreover, existing works in traffic engineering discuss fairness over-simplistically and non-systematically, focussing on only a few definitions such as equality, neglecting the complexity and multidimensionality of fairness. The mission of this work is (i) to challenge the efficiency-driven engineering paradigm of traffic engineering, (ii) to establish a link to modern fairness theories and to systemize equity research, (iii) to operationalize fairness into traffic engineering and control in a multidimensional, integrative manner as resource allocation mechanism, and (iv) to highlight the importance of fairness when allocating scarce, public good, mobility resources between road users. A quantitative, ideology-free, mode-agnostic, distributive fairness framework for mobility resource allocation is proposed, which enables the operationalization of fairness into traffic engineering. It serves when designing traffic control solutions, and convinces in public debates with a useful, argumentative tool-set to confront equity considerations. Ultimately, this enables systematic research and design of fairness-informed control systems, demonstrated by three case studies on signalized intersection management and static road pricing.

Towards high-resolution, error-aware, spatiotemporal air quality modeling in urban environments

(#17) Anna Paulish (EPFL,HOMES), Kenan Zhang (EPFL,HOMES)

Air pollution is one of the leading global health risks, causing millions of premature deaths worldwide each year. A key challenge in addressing this problem is that exposure is highly non-uniform: pollutant concentrations can vary dramatically over very short distances, sometimes within just a few meters. High-resolution air-quality modeling in urban environments is further complicated by the sparse, heterogeneous, and multi-modal nature of available data. Mobile sensors provide dense but noisy observations, while reference stations and satellite measurements offer higher quality data with limited or inconsistent spatial coverage. To address these challenges, we propose a Bayesian modeling framework based on Gaussian process regression. The framework integrates heteroscedastic regression to capture input-dependent uncertainty and multi-fidelity learning to combine dense low-fidelity and sparse high-fidelity data sources. Structured spatiotemporal kernel compositions are used

to model interactions among spatial, temporal, and environmental variables. The overall goal of this work is to provide high-resolution urban air-quality estimates with well-calibrated uncertainty, enabling downstream tasks such as active sensing and cross-city generalization across diverse urban environments.

Towards a Quantitative Spatial Model for Switzerland: Prototype Implementation and Lessons Learned from Ticino

(#56) Davi Guggisberg(IIDE/HEIG-VD), Daniel Hörcher (Corvinus Budapest), Eva Heinen (ETH,IVT,TMP), Matthieu de Lapparent (IIDE/HEIG-VD)

Quantitative spatial models (QSMs) enable general equilibrium evaluation of transport investments, yet no such model exists for Switzerland, partly because operating one at fine spatial resolution requires floorspace price data that is not publicly available. This paper proposes a stock-inversion procedure that recovers floorspace prices from observed building stock using the model's equilibrium conditions, bypassing this data constraint. We develop a QSM prototype for the canton of Ticino, building on Hörcher and Graham (2025), and apply it to investigate the Ceneri Base Tunnel's opening. In the Bellinzona–Lugano corridor, our model predicts employment concentration in Lugano, residential decentralisation towards Bellinzona, and agglomeration-driven productivity gains, while the average value of time declines even as total welfare rises. At the cantonal scale, the inversion produces implausible results where the observed stock reflects market forces outside the model's demand structure — such as vacation homes and retirement occupancy — revealing that the reliability of the recovered prices depends on the match between model assumptions and the forces that shaped the data. The prototype provides a foundation for a national QSM capable of evaluating how large transport investments reshape Switzerland's spatial economy.

Transition trajectories from 50 years of travel surveys

(#15) Clément Rames (EPFL,LASUR), Martin Simon (EPFL,LASUR)

We analyze mobility transition trajectories in Switzerland between the 1970s and the 2020's through five indicators: (a) the evolution of modal share and the contextual reasons driving this evolution; (b) the total passenger-kilometers travelled per year, (c) the number of registered motor vehicles per capita; (d) the network length of highways; and (e) the network length of railway tracks in service. We leverage five decades of travel surveys (MTMC) to compare the evolution of these mobility indicators, both at the national scale and at the metropolitan scale. For the latter, we zoom in on the following urban areas: Basel, Bern, Geneva, Lausanne and Zürich. We identify the following patterns, not as global overarching dynamics, but rather as relevant descriptors for certain indicators, in situated historical and geographical contexts, at a specific scale. For instance, while in certain metropolitan areas which implemented ambitious mobility policy and infrastructure projects, a significant modal shift can be observed over the last 50 years, at the national scale, the passenger-kilometer travelled increase in absolute terms for all modes. While motor vehicle registrations per capita have decreased since the 2000s, the total distance travelled has grown steadily, propelled by an increase in long-distance travel.

Two-stage optimization approach for dynamic routing and charging scheduling in electrified-autonomous flexible transit

(#18) Haoran Jiang (EPFL,HOMES), Shaozhi Hong (Tongji), Kenan Zhang (EPFL,HOMES), Qing Yu (Beijing University)

Electrified-Autonomous Flexible Transit (E-AFT) represents a promising paradigm for on-demand mobility, necessitating the integration of routing and energy management to ensure viable operations. This study develops a two-stage optimization model for dynamic vehicle routing and charging scheduling, formulated as a Mixed-Integer Nonlinear Programming (MINLP) framework designed to maximize overall system profit. In the first stage, an Adaptive Large Neighborhood Search (ALNS) algorithm determines routes to maximize operation profit, with energy consumption and time constraints explicitly linking to the second stage Variable Neighborhood Search (VNS) which optimizes charging schedules to minimize total charging costs. This sequential ALNS-VNS procedure is embedded within a Rolling Horizon Control (RHC) strategy, effectively tackling the computational challenges of large-scale, real-time demand through iterative subproblem resolution. Validation using real-world urban network case studies demonstrates the model's effectiveness: the ALNS-VNS approach achieves near-optimal

solutions with superior computational efficiency, and the RHC framework reveals the significant impact of horizon interval and battery capacity on service reliability and economic feasibility, offering valuable insights for E-AFT system design.

Using big data and deep learning to decode the links between shared e-bike travel behaviors and street environments in Seville, Spain

(#33) Xuan He (ETH,IVT,TMP), Katja Schimohr (ETH,IVT,TMP), Eva Heinen (ETH,IVT,TMP)

Promoting the use of micromobility can yield substantial social and environmental benefits. However, very limited research has examined the links between micromobility travel behavior and street environments. This study leverages big data and deep learning techniques to explore the spatial dynamics between street environments and shared e-bike travel behaviors in Seville, Spain. We employ cutting-edge semantic segmentation models to extract diverse street elements from over 1.1 million street view images. Spatiotemporal patterns of over 36,000 e-bike trips are derived from more than 5 million GPS tracks. Furthermore, we examine how e-bike riding volumes are associated with street elements at the street segment level using the Graph Attention Network (GAT). Results show that shared e-bike trips in Seville are primarily made by males, young people, and tourists. E-bike rides are clustered in urban areas and arterial roads, and largely during daytime hours. The high-importance street segments are mainly in arterials, riverside streets, and bridges. Regarding the average importance for segment riding volumes, the most important element is bicycle lanes, followed by sidewalks, shelters, sky, greenery, and public transport stations. Based on the findings, we proposed tailored intervention strategies and policy implications for designing cycling-friendly environments to promote the use of micromobility.

Understanding User Acceptance of Autonomous Valet Parking: Insights from the extend UTAUT2 Framework

(#75) Jinrui Gong (Zhenjiang University)

Autonomous Valet Parking (AVP) has been widely recognized as a promising solution to urban parking challenges, attracting growing interest in AVP-oriented parking management and operations. However, the large-scale deployment and practical benefits of AVP ultimately depend on widespread public acceptance. Although substantial efforts have been made to investigate the adoption intention of autonomous vehicles (AVs), relatively few studies have specifically examined AVP as a distinct technological application. To address this gap, this study develops an extended AVP acceptance framework based on the Unified Theory of Acceptance and Use of Technology 2 (UTAUT2). A total of 1,041 valid responses collected in China were used to analyze technology acceptance and heterogeneity across latent groups and four parking scenarios. The PLS-SEM results show that facilitating conditions, performance expectancy, effort expectancy, and price value significantly enhance adoption intention, while perceived risk negatively influences adoption intention both directly and indirectly through its erosion of trust. Furthermore, two latent user segments with different behavioral patterns were identified by FIMIX-PLS. The majority group evaluates AVP adoption primarily through a risk–benefit trade-off, whereas approximately 12% of users exhibit more favorable attitudes toward AVP. In addition, we emphasized the difference between contextualized choices and intentions through GEE analysis. These findings could advance theoretical understanding of AVP acceptance and offer practical implications for policymakers and industry practitioners in promotion and management.

What happens in between activities and intermodality

(#54) Florian Masse (Transports Publics Genevois & EPFL,LASUR), Nicola Ortelli (Transports Publics Genevois), Vincent Kaufmann (EPFL,LASUR), Emmanuel Ravalet(Bureau BMH), Daniel Reck (Transports Publics Genevois)

Intermodality is increasingly recognised as a key component of sustainable urban mobility, notably for its potential to improve accessibility through the combination of transport modes and to reduce carbon emissions. However, the intermediate phases of trips such as waiting times, transfer durations, and walking distances remain insufficiently understood and often poorly represented in accessibility analyses and transport models. This paper investigates intermodality with a specific focus on how transitions are structured both between activities and transport, and between different transport modes within the same trip. Using detailed trip chain data from a 2 weeks GPS experiment in Geneva, Switzerland, in October 2024, this study examines how these interstitial components vary according to mode combinations, spatial contexts, and activity sequences, as these elements strongly influence

perceived travel effort and modal choice (Kosmidis, Müller-Eie, 2023 ; Thomas, Schweizer, 2003) By modelling transfer-related attributes, the results reveal substantial heterogeneity in transition conditions across trips and contexts, confirming that average or fixed transfer assumptions mask important behavioural differences. These findings are consistent with recent evidence showing that activity-end and transfer characteristics play a critical role in intermodal travel choices (Geržinič et al., 2026).

What makes cycling attractive in Yverdon-les-Bains?
Willingness to detour for better routes

(#49) Selin Ataç (HEIG-VD), Teo Colombretto (HEIG-VD), Matthieu de Lapparent (HEIG-VD), Benoît Corday (City of Yverdon-les-Bain), Léa Bovay (City of Yverdon-les-Bain),

Cities aim to increase cycling, but investment decisions are often made with limited evidence on what improvements cyclists value most. The most direct corridors are usually also the hardest places to build high-quality cycling infrastructure because road space is limited and competing needs are strong. An alternative is to develop parallel routes that may be slightly longer but o>er better comfort and perceived safety. Whether this strategy works depends on how much detour people are willing to accept. This paper examines cyclists' willingness to detour in Yverdon-les-Bains, Switzerland. Through a large online survey, we document mobility patterns, cycling frequency, and the factors that encourage/discourage cycling. Participants also evaluate realistic route and parking situations and make choices between alternatives that trade o> directness against route quality. The analysis quantifies how improvements such as better separation from car and public transport tra>ic, smoother and more continuous routes, and more secure end-of-trip facilities influence people's willingness to cycle and their route choice. The findings provide evidence to guide investment choices for cycling infrastructure in Yverdon-les-Bains.

What spatial resolution and regional scope are required to quantify accessibility?
A multi-scale approach and evaluation

(#55) Marco Miotti (ETH,EcoSystems)

Accurate transport and land use modeling requires balancing high spatial resolution with broad geographical coverage. While regional analysis demands extensive scope, capturing active mobility requires micro-scale granularity, often leading to computationally prohibitive Origin-Destination matrices. This work addresses this constraint by introducing a multi-scale accessibility framework utilizing asymmetric matrices. By nesting a highresolution hexagonal grid within standard TraDic Analysis Zones (TAZs), the trade-oD between computational cost and model accuracy is optimized. A sensitivity analysis, calibrated on data from the Zurich metropolitan area in Switzerland reveals that a cell resolution of 100 m is critical for quantifying micro-accessibility. A high-resolution buDer of 1 km is identified as the optimal `walkability horizon' to capture local behavior. Furthermore, results demonstrate that regional cutoDs must be function-dependent: a 40 km radius is necessary to represent commuting labor markets, whereas 5-10 km suDices for discretionary service trips. This hybrid approach enables the integration of precise pedestrian metrics into regional Land Use Transport Interaction (LUTI) models without sacrificing operational deficiency.