Year Report 2022
TRAIL Research School

TRAIL Research School, February 2023

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Selected Highlights TRAIL Research School 2022

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- 5 Masterclasses for I and W policymakers
- Publication of the book 'Van Wee, B., J.A. Annema, J. Köhler (Eds.) (2022), Innovations in Transport. Cheltenham: Edward Elgar (open access, https://rstrail.nl/wp-content/uploads/2022/11/innovations-in-transport.pdf)






1. What is TRAIL Research School?

TRAIL, the research school for TRAnsport, Infrastructure and Logistics, was founded in 1994 to combine academic education, research, and applied science in a network organization of five Dutch universities (Delft University of Technology, Erasmus University Rotterdam, Radboud University Nijmegen, Eindhoven University of Technology, the University of Twente and the University of Groningen). Now, various faculties and institutes (in the field of economics, technology, policy and management, and the social and behavioral sciences) form a strong network of scientific experts in the integrated area of transport, infrastructure, and logistics.

TRAIL carries out three types of interconnected activities:

1. Training & Education: to educate PhD students and support PhD students in organizing their projects;
2. Research & Development: to initiate and stimulate academic research opportunities;
3. Knowledge Transfer: to promote and perform knowledge transfer activities among TRAIL researchers, related research institutes, and potential users (public and private).

On 31-12-2022 TRAIL counted 62 Staff members, 1 associated staff member, and 135 PhD candidates (see Appendices 2 and 3). The organizational structure of TRAIL Research School consists of the following bodies:[1]

1. Supervisory Board, consisting of representatives from the participating universities (deans), chaired by an independent chair;
2. Management Team, consisting of the Scientific Director and the Managing Director and supported by the TRAIL office;
3. Program Board, consisting of TRAIL-research theme leaders and a member of the PhD council;
4. PhD Council, consisting of seven representatives of TRAIL PhD students.

Sections 2 to 4 present specific highlights in the field of Training and Education, Research and Development, respectively Knowledge Transfer. Finally, in section 5, some concluding remarks and an overall outlook of TRAIL for 2023 and further is presented.

[1] See www.rstrail.nl for the current members of the different bodies

2. Training & Education

Training & Education is the core activity of the TRAIL Research School. In 2022 TRAIL performed the following activities:

- The organization of 7 PhD courses
- The organization of 10 additional courses in the 2-years cycle of the graduate program with Research Schools Beta and ERIM on Operations Management and Logistics (GP-OML)

2.1 TRAIL courses and seminars in 2022

Table 1 gives an overview of the overall TRAIL course program.

With respect to the contents, the T&E program increasingly focuses explicitly on providing courses in the field of Transport, Infrastructure and Logistics (TIL) only (non-TRAIL related courses are the responsibility of the local Graduate Schools). TIL-courses provide knowledge about theories, methods, empirics, and skills for the TIL-domain. TIL-courses are provided by TRAIL or similar institutes (e.g. Beta, Disc, LNMB, Nethur, ERIM, Research Masters Stream (VU))..

With respect to the rules, the T&E program enables a high level of flexibility for students with various backgrounds and needs. Therefore, TRAIL applies the following principles/rules:

- TRAIL welcomes all PhD students (TRAIL and non-TRAIL[2] PhD students) for following courses.
- At a minimum, PhD students who only follow one or more TIL-courses receive a certificate per course. If they, in addition, successfully pass for the course (e.g. by an assignment), this will be made explicit on the certificate.
- TRAIL offers the option to go for a TRAIL diploma (15 ECTS) – for more details see our website.

[2] For non-TRAIL PhD students a fee applies, unless there is an agreement between TRAIL and the PhD student's institute. Please contact TRAIL Office for details: info@rstrail.nl

Table 1: TRAIL T&E course program

	By	***Part*** [1]	***ECTS*** [2]	***TUD GS credits*** [3]	***TUD GS category***[4]
Introduction to TRAIL and the PhD student process (0.5d) [0] *(Marchau & Van Wee)*	TRAIL	S	0.25	0.5	discipline/ research

I TRAIL Basic Courses [5]	***By***	***Part*** [1]	***ECTS*** [2]	***TUD GS credits***[3]	***TUD GS category***[4]
Fundamental Knowledge on Transport, Infrastructure & Logistics *(Annema & Van Wee)* – (4d) [6]	OML	D	1 - 4	4 - 5	discipline
TRAIL Theories and Methods (3d) *(Marchau & others)*	TRAIL	T, M	1 - 3	3 - 5	discipline/ research

II General TRAIL Courses	***By***	***Part*** [1]	***ECTS*** [2]	***TUD GS credits***[3]	***TUD GS category***[4]
TRAIL Writing a Literature Review in the TIL Domain (2d) *(Van Wee)* [6]	OML	S	1 - 4	2 - 5	discipline/ research
Machine Learning (4d) [6] *(Almeida & Van Nieuwenhuyse)*	OML	M	2 - 4	4 - 5	discipline/ research
TRAIL Data-analysis and Statistics (3d) *(Kroesen & Molin)*	TRAIL	S	1 - 3	3 - 5	discipline/ research
Societal Relevance of your PhD Research (1d) *(Annema & Van Wee)*	TRAIL	S	0.25 – 1	0.5 - 2	discipline/ research
Writing and Publishing a TRAIL Research Article (1d) *(Geurs & Rezaei)*	TRAIL	S	0.5 - 1	1 - 2	discipline/ research
Discrete Choice Analysis: micro-econometrics and machine learning approaches (4d) *(Chorus & Van Cranenburgh)*	TRAIL	T	2	3	discipline/ research
Stated Choice Data Collection (1,5) *(Rasouli & Caiati)*	TRAIL	M	1	2	discipline/ research
Transport Innovations (1d) *(Annema, Geerlings & Wiegmans)*	TRAIL	D	0.5 - 1	1 - 2	discipline
Capita selecta: How to Write a Review Report (1d)	OML	S	1	1	Research

III TRAIL Specialisation Courses	***By***	***Part*** [7]	***ECTS*** [2]	***TUD GS credits*** [3]	***TUD GS category***[4]
Capita selecta - Reinforcement Learning for Operations Management (2d) *(Boute, Mes & Van Jaarsveld)*	OML	L	4	4	discipline
Traffic Flow Operations and AI (3d) *(Hoogendoorn & Van Lint)*	TRAIL	I	1 - 2	2 - 3	discipline
Behavioural Aspects in Transport (1d) *(De Waard & Veldstra)*	TRAIL	I	0.5 – 1	1 - 2	discipline
Transport Logistics Modelling (4d) [6] *(Tavasszy & Zuidwijk)*	OML	L	1 - 4	4 - 5	discipline/ research
Facility Logistics Management (4d) [6] *(Adan & De Koster)*	OML	L	1 - 4	4 - 5	discipline
Quantitative Modelling and Analysis of Supply Chains (4d) [6] *(De Kok)*	OML	L	1 - 4	4 - 5	discipline/ research
Advanced Inventory Theory (4d) [6] *(Dekker & Van Houtum)*	OML	L	1 - 4	4 - 5	discipline
Freight Transport Management (4d) [6] *(Roodbergen)*	OML	L	1 - 4	4 - 5	discipline

Passenger Transport Systems (4d) [6] *(Cats & Schmidt)*	OML	L	1 - 4	4 - 5	discipline
Capita selecta – various (2d) [6,8]	OML		0.5 - 2	2 - 3	discipline/ research

Legend to table 1

Yearly
Every 1.5 years
Every 2 years

[0] Between brackets number of course days

[1] D = Domain Knowledge
T = Theory
M = Methodology
S = Skills

[2] First number = participated in course – second number = participated in course & passed assignment/exam

[3] The Promotor decides about the number of TUD GS credits to be administered in DMA

[4] PhD student can choose either category, since TRAIL 'methodology' and 'skills' courses are strongly linked to the TRAIL 'discipline'

[5] Mandatory courses for the TRAIL Diploma

[6] Courses given by TRAIL and Research School Beta within the Graduate Program Operations Management and Logistics (GP-OML).

[7] T: Transport, I: Infrastructure, L: Logistics

Table 2: TRAIL courses 2022

Introduction to TRAIL & the PhD students process (online)	25 Jan.
TRAIL Theories & Methods	10 May
Societal Relevance of your PhD Research	30 June
Discrete Choice Analysis: micro-econometrics and machine learning approaches	5 July
Data-analysis and Statistics	4-Oct.
Stated Choice Data collection	27 & 28 Oct.
Writing & Publishing a TRAIL Research Article	25 Nov.

Table 3: GP-OML courses 2022

Passenger Transport Systems: networks, operations and behavioral models	1 Feb.
Transport Logistics Modelling	6 Apr.
Machine Learning	13 May
Writing a Literature Review in the TIL-domain	23 Feb.
How to Write a Review Report	28 Sep.
Fundamental Knowledge on Transport, Infrastructure & Logistics	7 Sep.
Empirical Methods in Supply Chain Management	19 Oct.
Quantitative Modelling and Analysis of Supply Chains	5 Oct.
Behavioral Operations Management	23 Nov.
Reinforcement Learning for Operations Management	7 Dec.

In August the TRAIL International PhD Summer School on 'Automated Driving' was organised at TU Delft. There were 27 participants, 2/3 of which were external PhD students. The overall evaluation grade was a 9.

In summary, despite COVID-19, TRAIL has been able to continue almost all education activities (online or hybrid).

2.2 Graduate Program – Operations Management and Logistics

The Operations Management and Logistics (OML)-program started early 2014. The OML-program is a joint effort of the research schools TRAIL, Beta, and ERIM to:

1. offer PhD courses within the area Operations Management & Logistics;
2. control the quality of the offered PhD courses and the whole program.

Some specific characteristics of this GP-OML are:

- The OML program runs for 2 years and consists of 9 courses (each about 4-ects, including preparation and assignment);
- Per semester, three 4-day courses are given on a fixed day (Wednesday) every week at a central location in the Netherlands;
- Each course is examined by e.g. an assignment.

See table 3 for GP-OML course titles.

2.3 Evaluation results

A 2022 evaluation of the TRAIL T&E program revealed the following:

- Most basic and specialization courses are given on a regular basis (i.e. once every 1, 1.5, or 2 years).
- In 2022 no courses have been cancelled; for one GP-OML course an alternative course was offered because of too few participants.
- Most courses have about 10 or more participants. The average number per course in 2022 was 16 participants.
- Most courses are graded highly by the students (between 7.5 and 8.5

The quality of courses is more important for TRAIL than the quantity. Again, the credits are for the staff members and more specifically the course managers and teachers. TRAIL is very proud to see the very positive evaluation results, and the positive trend in these results (see table below).

Table 5: average grade all courses.

year	
2013	7.8
2014	7.6
2015	8.2
2016	8.4
2017	7.9
2018	8.5
2019	8.3
2020	8.3
2021	8.3
2022	8.3

2.4 Origins of PhD students

The Table below indicates the origin of starting TRAIL PhD students for the period 2010-2022. The figures show that after strong increases in TRAIL PhD students in 2015 and 2016, 2021 marked again an average year of inflow. However, 2022 broke all records, 45 new PhD students became a member off TRAIL This is related to varying research funding opportunities over different years (e.g. NWO).

Table 6: Origins of PhD students

Country	***2022***	***2021***	***2020***	***2019***	***2018***	***2017***	***2016***	***2015***	***2014***	***2013***	***2012***	***2011***	***2010***
Netherlands	8	8	5	7	8	3	14	13	2	7	6	7	9
China	11	6	6	6	2	8	10	10	10	2	5	5	1
Europe	12	2	6	3	5	5	8	1	4	0	1	5	5
Middle-East	8	4	2	4	3	1	4	1	2	2	3	4	2
North-America							1						1
South-America	1			1		1	1	1	0	0	0	0	0
Africa													1
Asia	5		1	4	3	1	5	4			1	1	1
	45	**20**	**20**	**25**	**21**	**20**	**43**	**30**	**18**	**11**	**16**	**22**	**20**

2.5 TRAIL Training and Education outlook

The education activities mentioned in section 2.1-2.3 will be continued in 2023 and further. Due to COVID-19 developments, TRAIL has gained a lot of experience with online and hybrid lecturing. These experiences will be used in the future, e.g. some courses might be offered hybrid (or even fully online) to attract more PhD students (also from outside TRAIL). In addition, courses might be recorded so that students can follow these in their own time. In 2023, TRAIL also plans to have an International PhD Summer School again (The topic will likely be Cycling).

3. Research

TRAIL PhD students and staff members perform research activities on Transport, Infrastructure and Logistics. The logical structure of the TRAIL Research Program follows this simple triad and distinguishes the following themes and subthemes are:

A. TRAnsport and Mobility
   a. Demand – Supply Interaction
   b. Policy, Planning, and Management
B. Infrastructure and Traffic Management
   a. Drivers' Behavior
   b. (Dynamic) Traffic Management
   c. Intelligent Transport Systems
C. Logistics and Transport Organization
   a. Logistics and Supply Chain Management
   b. Transport (Service) Networks
   c. Network Design.

3.1 PhD Research

Dissertations
In 2022, 18 TRAIL PhD students received a PhD degree (see below). In Appendix 1 the summaries of these theses are given.

1. Scheepmaker, G.M., Energy-efficient Train Timetabling, T2022/1, January 2022, TRAIL Thesis Series, the Netherlands
2. Feng, Y., Pedestrian Wayfinding and Evacuation in Virtual Reality, T2022/2, January 2022, TRAIL Thesis Series, the Netherlands
3. Liu, M., Cooperative Urban Driving Strategies at Signalized Intersections, T2022/3, January 2022, TRAIL Thesis Series, the Netherlands
4. Paul, J., Online Grocery Operations in Omni-channel Retailing: opportunities and challenges, T2022/4, March 2022, TRAIL Thesis Series, the Netherlands
5. Reggiani, G., A Multiscale View on Bikeability of Urban Networks, T2022/5, May 2022, TRAIL Thesis Series, the Netherlands
6. Huang, B., Assessing Reference Dependence in Travel Choice Behaviour, T2022/6, May 2022, TRAIL Thesis Series, the Netherlands
7. Fahim, P.B.M., The Future of Ports in the Physical Internet, T2022/7, May 2022, TRAIL Thesis Series, the Netherlands
8. Zeinaly, Y., Model-based Control of Large-scale Baggage Handling Systems: Leveraging the theory of linear positive systems for robust scalable control design, T2022/8, June 2022, TRAIL Thesis Series, the Netherlands
9. Larsen, R.B., Real-time Co-planning in Synchromodal Transport Networks using Model Predictive Control, T2022/9, September 2022, TRAIL Thesis Series, the Netherlands
10. Du, Z., Cooperative Control of Autonomous Multi-Vessel Systems for Floating Object Manipulation, T2022/10, September 2022, TRAIL Thesis Series, the Netherlands
11. Dixit, M., Transit Performance Assessment and Route Choice Modelling Using Smart Card Data, T2022/11, October 2022, TRAIL Thesis Series, the Netherlands
12. Haas, M. de, Longitudinal Studies in Travel Behaviour Research, T2022/12, October 2022, TRAIL Thesis Series, the Netherlands
13. Heuvel, J. van den, Mind Your Passenger! The passenger capacity of platforms at railway stations in the Netherlands, T2022/13, October 2022, TRAIL Thesis Series, the Netherlands
14. Nadi Najafabadi, A., Data-Driven Modelling of Routing and Scheduling in Freight Transport, T2022/14, October 2022, TRAIL Thesis Series, the Netherlands
15. Giudici, A., Cooperation, Reliability, and Matching in Inland Freight Transport, T2022/15, December 2022, TRAIL Thesis Series, the Netherlands
16. Yan, Y., Wear Behaviour of A Convex Pattern Surface for Bulk Handling Equipment, T2022/16, December 2022, Thesis Series, the Netherlands

17. Zhou, Y., Ship Behavior in Ports and Waterways: An empirical perspective, T2022/17, December 2022, Thesis Series, the Netherlands
18. Szép, T., Identifying Moral Antecedents of Decision-Making in Discrete Choice Models, T2022/18, December 2022, Thesis Series, the Netherlands

An impression of the TRAIL theses

In 2022, 45 PhD students started at TRAIL. This is significantly higher than the average number of PhD students that over the past years (e.g. 21 per year on average in the period 2017-2021) Table 7 gives an overview of the new projects.

Table 7: Newly started PhD students at TRAIL in 2022

Title Research	**Name**	**PhD**	**Univ.**	**Faculty**	**Finance source**
Sharehouse: Human-Technology interaction in warehouse environments	Mahsa	Alirezaei	EUR	RSM	
Providing routing strategies for e-hailing drivers and pricing strategies for e-hailing platforms to maximize the total expected reward in the presence of market competition and stochasticity in the reward function using predict + optimize method.	Elif	Arslan	TUD	CiTG	
The Impact of Various IT-based Crowd Management Measures for Crowded Pedestrian Infrastructures	Arco	Van Beek	TUD	CiTG	
Interactive Multiscale Visualization of Mobility Networks	Saman	Behrouzi	TUD	CiTG	
Storage, Handling, and Bunkering of Solid Hydrogen Carriers	Marcel	Van Benten	TUD	3ME	
Operation & Maintenance Optimization of Offshore Wind Farms	Marco	Borsotti	TUD	3ME	
Understanding Urban Noise Pollution with Machine Learning	Lion	Cassens	TUD	TBM	
Design of Soft Grasping Gripper with Actively Stimulated Particles	Qianyi	Chen	TUD	3ME	China Scholarship Council
Robust train trajectory optimization	Alex	Cunillera	TUD	CiTG	NS
Fault Diagnosis for safe Control and Coordination of Inland Waterway Interconnected Systems	Abhishek	Dhyani	TUD	3ME	EU
An econometric framework to analyze two-sided markets: A case study of Mobility-on-Demand (MOD) services	Subodh	Dubey	TUD	CiTG	ERC grant
Understanding the Relationships among Urban Space, Urban Perceptions, and their Impact on In-person Social Interactions	Francisco	Garrido-Valenzuela	TUD	TBM	
Leveraging New Technologies and Data Sources to Enhance Material Handling Effiency	Mahdi	Ghorashi Khalilabadi	EUR	RSM	
Routing and Network Design for the Hydrogen Economy	Umur	Hasturk	RUG	E&B	FCHJU
Vehicle Coordination in Urban Traffic: a perspective from human behaviour and decisions	Yiru	Jiao	TUD	CiTG	TU Delft AI Labs

Traffic Modelling and Impact Assessment for Sustainable Integrated Traffic Management	Ahmed	Khaqan	TUD	CiTG	TULIPS
Flexible Railway Timetabling with Demand-driven Train Service Variations	Renate	Van der Knaap	TUD	CiTG	NS
New home, new travel habits? Understanding the process of (un)sustainable travel choices and car ownership of new residents of (new) urban neighbourhoods in the Netherlands.	Tessa	Leferink	TUE	IE&IS	N W O
Intelligent Power and Energy Management System for DC Energy Distribution Systems for Methanol-Fuelled Ships	Charlotte	Loeffler	TUD	3ME	
Decision-making for Reliable Supply Chains	Yvonne	Lont	TUD	TBM	
Dimensioning On-Demand Multimodal Micro-Mobility Sharing Systems	Sara	Momen	TUD	CiTG	
Cooperative Port: Vessel service providers perspective	Shahrzad	Nikghadam	TUD	TBM	
Application of Metaheuristic Algorithms in Optimization Problems and Intersection with Machine Learning	Stelios	Nikolakakis	RUG	E&B	
Hydrogen-based Vessels Data Analysis and Analytics for Control and Condition Monitoring of Primary Onboard Systems	Esma	Özdemir	TUD	3ME	
Multi-Objective Dynamic Geo-Fencing in Metropolitan Transportation Networks	Nirvana	Pecorari	TUD	CiTG	
Towards Safe Mobility for All: a data-driven approach	Angèle	Picco	RUG	B&SS	
Optimization of Maritime Transportation System Performance to Reduce Regional Development Disparity in Archipelagic Country (Case Study: Indonesia)	Lisna	Rahayu	RUG	SS	BPI LPDP Scholarship and Top Up Scholarship RUG
Traffic Impact Assessment Considering Connected and Autonomous Vehicles	Saeed	Rahmani	TUD	CiTG	HiDRIVE
Self-Organizing Modelling for Railway Traffic Management	Konstantinos	Rigos	TUD	CiTG	
Simulation of flow and packing behaviour of multi-component mixtures	Raïsa	Roeplal	TUD	3ME	
Mobility Hubs for Inclusive and Sustainable Accessibility in Low-Dense Contexts	Tibor	Rongen	RUG	SS	N W O
Integrated Micro and Macroscopic Methods for Safe and Efficient Traffic of Connected Vulnerable Bicyclists and Automated Vehicles	Christoph	Schmidt	TUD	3ME	
Towards Safe Navigation: human-maritime autonomous surface ship interaction in a mixed waterborne transport system	Rongxin	Song	TUD	TBM	China Scholarship Council

Meaningful Human Control	Lucas	Suryana	TUD	CiTG	LPDP scholarship
Towards Net-zero Emissiion Port Operations	Xinyu	Tang	TUD	3ME	Scholarschip
Multidimensional wellbeing and participatory value evaluation (PVE	Martijn	De Vries	TUD	TBM	
UNRAVELED: UNderstanding tRAffic effects on paVement ravELing by fiEld Data	Zili	Wang	TUD	CiTG	Rijkswaterstaat
Data-driven Prediction of Multimodal Urban Traffic Operation with Distributed Learning	Xiamei	Wen	TUD	CiTG	China Scholarship Council
Cooperative Control	Xin	Xiong	TUD	3ME	
Sliding wear reduction of bulk handling equipment with discrete element method	Yunpeng	Yan	TUD	3ME	
Traffic Heterogeneity with Connectivity and Connected Automated Vehicles	Xue	Yao	TUD	CiTG	
Transit Oriented Development as an Inclusive and Just Transport Planning Approach: a look into the trips of full-time homemakers through the cases of Hong Kong and the Netherlands	Ki Fung	Yip	RUG	SS	
Human-like Driving Behaviour Model	Yuxia	Yuan	TUD	CiTG	China Scholarship Council
Research on Decision-making Method of Smart vehicle Driving Behavior	Jingyang	Zhao	TUD	CiTG	China Scholarship Council
Simulation and Analysis of Sustainable Methanol-fueled Marine Internal Combustion Engines	Konstantinos	Zoumpourlos	TUD	3ME	

DUT – Delft University of Technology: CEG – Civil Engineering and Geosciences / TPM – Technology, Policy and Management / 3ME – Mechanical, Maritime and Materials Engineering
EUR – Erasmus University Rotterdam: RSM – Rotterdam School of Management
EUT – Eindhoven University of Technology – Building Environment
UT – University of Twente: ET –Engineering Technology
RU – Radboud University: NSM – Nijmegen School of Management
RUG – University of Groningen – Economics & Business

3.2 Future developments in research

As regular funding of PhD research by Universities has almost completely disappeared, other sources for funding interdisciplinary research need to be found and developed. TRAIL will continue to play a role in finding and developing new funding opportunities if applicable, and we will provide input for developing new large NWO-funded programs if applicable. More specifically, the SURF program ended in 2021. TRAIL was interviewed by persons taking the lead in a follow-up scientific program, and gave a lot of input/suggestions. In addition we offered to contribute in follow-up actions. On January 10th, 2023 the call for the new follow-up program 'Mobility in a sustainable future' was launched. Former Scientific Director of TRAIL Bert van Wee contributed to this call.

4. Knowledge Transfer

4.1 Ktrans highlights 2022

TRAIL PhD Congress 2022
This year we were able to organize the annual TRAIL PhD congress on-site again. It was a very successful congress with many enthusiastic reactions. The congress was held in Grand Hotel Karel V in Utrecht, where almost 100 participants saw how a total of 48 TRAIL PhD students gave a presentation about their research. This was the highest number of presentations since 2016 and, as every year, the speakers received tips & tops about their presentation from a TRAIL staff member. During the different breaks, there was plenty of opportunity for catching up. The participants were also very pleased with the interactive parts of the congress, such as speed dating and a Q&A session about life after your PhD study. In the evening, the Best Presentation Award was presented to Irene van Droffelaar for the second time in a row.

TRAIL/TUD-IenW Masterclasses
Since 2013, TRAIL is organising Master classes (about 6 to 8 per year) for the Ministry of Infrastructure and Water Management. These Master classes are part of an agreement between the Ministry and the TU Delft about knowledge exchange, education, cooperation, etc. During these Master classes, scientists of the TU Delft and other (often TRAIL) universities present and discuss the latest scientific insights on specific topics with policymakers. In 2022, the following 5 Master classes were organized by TRAIL (all in Dutch):

Nederland moet zich snel bezinnen op 'geo-economisch' beleid
De internationale politieke en economische omgeving van het goederenvervoer verandert. Denk aan daarbij aan China met het haar Belt and Road Initiative (BRI), haar grondstoffenpolitiek en een vaak offensieve houding tegen de bestaande (westerse) handelsakkoorden. De corona-pandemie toonde bovendien de kwetsbaarheid aan van enkele essentiële goederenstromen. Het is tijd voor een meer geo-economisch bewustzijn van de Nederlandse positie in Europa en wereldwijd. Hamvraag: welke eigen industrieën moet de logistiek dienen? Sprekers Haroon Sheikh en Lori Tavasszy analyseerden scherp n riepen op tot snelle actie.

Climate change: shaping urban resilience
Voor een effectief klimaatbeleid – mitigatie én adaptatie – is het nodig om samen te werken over departementsgrenzen heen en ook dwars door alle overheidsschalen. De rol van overheden, burgers en andere stakeholders in de dagelijkse leefomgeving in onze stedelijke gebieden is hierbij niet te overschatten. Hoe kunnen zij samenwerken om klimaatverandering het hoofd te bieden? En hoe kunnen beleidsmakers die verantwoordelijk zijn voor de kritische infrastructuur ondersteund worden met recent ontwikkelde inzichten en instrumenten?

Stedelijke bereikbaarheid gebaat met meer visie en toekomstbestendigheid
Hoe houden we de steden goed bereikbaar: nu en in de toekomst? En welke rol kunnen mobiliteitshubs, die momenteel zo in zwang lijken te zijn, spelen bij stedelijke bereikbaarheid? Onderzoekers uit twee lopende Europese NWO-projecten vertelden over hun eerste resultaten. 'Gemeenten hebben ondersteuning nodig bij het robuuster maken van hun mobiliteitsplannen,' stelde Sander Lenferink. En: 'Mobiliteitshubs moeten echt veel slimmer worden om daadwerkelijke maatschappelijke impact te hebben', observeerde Karst Geurs.

Transities: de comfortzone uit en de onzekerheid
De IenW-transities naar duurzame mobiliteit, circulaire economie en klimaatadaptatie, betekenen dat hele systemen 'om' moeten. Welke rol speelt het inzetten op gedragsverandering – bijvoorbeeld bij de vergroening van de logistiek – hierbij? En hoe kunnen ondernemers zich duurzamer gaan gedragen? Hoe kunnen de verschillende stakeholders omgaan met onzekerheid? Binnen het NWO-programma Transities en Gedrag werken onderzoekers uit de exacte en gedragswetenschappen samen met partners uit het bedrijfsleven, overheid en maatschappelijke organisaties in twaalf interdisciplinaire onderzoeksprojecten aan kennis rond gedrag die transities kan versnellen. Van twee van deze projecten presenteren Prof dr. Paul Chan en Prof. dr. ir. Rob van der Heijden de eerste inzichten. Paul Chan haalt ons uit de comfortzone en kijkt hoe we ons zelf en onze organisaties kunnen veranderen om te werken aan meerdere transities die in een stedelijke omgeving op ons afkomen. Rob van der Heijden kijkt vooral naar hoe we kunnen omgaan met onzekerheden in de transitie naar duurzame mobiliteit. Alhoewel er voorbeelden worden gebruikt van specifieke transities zijn de voordrachten van belang voor IenW- transities in het algemeen. Deze Masterclass is daarom interessant voor iedere IenW-er die aan transities werkt!

De toekomst van internationaal personenvervoer over het spoor
Op de middellange afstanden binnen Europa comfortabel, duurzaam en betaalbaar kunnen reizen: dat kan met de trein! Althans? Op dit moment wint het vliegtuig het nog vaak als reizigers hun trip gaan plannen. In december 2021 presenteerde de Europese Commissie dan ook een stevig actieplan voor verbetering van de internationale spoorverbindingen. Onderdeel hiervan is een mogelijke BTW-vrijstelling op internationale treintickets en nieuwe, snelle verbindingen. Daarnaast komt er een nieuw centraal boekingssysteem en betere dienstregelingen. Wat is hier allemaal voor nodig? En hoe kan IenW helpen?

Publication
Publication of the book 'Van Wee, B., J.A. Annema, J. Köhler (Eds.) (2022), Innovations in Transport. Cheltenham: Edward Elgar (open access, https://rstrail.nl/wp-content/uploads/2022/11/innovations-in-transport.pdf)

4.2 Outlook

Important activities in 2023 on Knowledge Transfer will be:

- TRAIL Internal PhD Congress
- Various TRAIL/DIMI/Ministry of Infrastructure and Water Management Masterclasses.
- Publication of the second edition of the book The transport system and transport policy. An introduction, replacing the first edition published in 2013.

5 Concluding remarks

In 2022, the Covid-19 pandemic came to an end everything turned back to normal. However some legacy remained, in short:

- most courses were given fully online or hybrid. It is expected that this will (partly) continue in the future.
- Master classes (Ministry) were given hybrid and on site
- The International PhD Summer school on Automated driving was offered in a hybrid way
- Fortunately after several years the Annual PhD conference was held onsite again

Appendix 1: Overview of TRAIL Theses in 2022

Transit Performance Assessment and Route Choice Modelling Using Smart Card Data
Malvika Dixit
For more than a decade now, automated transit data collection systems (like the smart card and Automatic Vehicle Location) have been implemented, providing access to a massive amount of passively collected data. Being relatively new, they have not yet been explored to their full potential. This thesis focuses on leveraging such data to make advances in transit performance assessment and route choice modelling, in the context of urban multi-modal transit networks.

Cooperative Control of Autonomous Multi-Vessel Systems for Floating Object Manipulation
Zhe DU
Maritime operations have become complex and large-scale, requiring the involvement of multi-vessel systems. This thesis provides a set of cooperative control schemes for autonomous multi-vessel systems to manipulate a floating object through physical interconnections in onshore (inland waterways and ports) and offshore areas. The proposed control schemes enable the manipulation system to deal with environmental disturbances, avoid collisions, regulate object speed, and dynamically coordinate the roles of tugboats.

The Future of Ports in the Physical Internet
Patrick Fahim
The Physical Internet is a holistic vision about the freight transport and logistics system of the future. Besides the convergence of technological and organizational innovations, it also addresses cross-industry interests like digitalization, standardization, and sustainability. As the hubs that facilitate most of the world's trade today, our focus is on maritime ports. The dissertation studies how ports can develop and position themselves within the new context of the Physical Internet.

Pedestrian Wayfinding and Evacuation in Virtual Reality
Yan Feng
This dissertation is focused on using Virtual Reality to study pedestrian wayfinding behaviour in buildings during both normal and emergency situations, from simple scenarios to complex scenarios. In particular, various empirical datasets featuring pedestrian wayfinding and evacuation behaviour were collected using different VR technologies to understand the usage of VR to investigate pedestrian behaviour and thereby generate new insights into pedestrian wayfinding behaviour in buildings. This thesis shows that different VR technologies (i.e., Mobile VR, HMD VR, Desktop VR) can collect valid behavioural data and study pedestrian wayfinding behaviour in various contexts.

Cooperation, Reliability, and Matching in Inland Freight Transport
Alberto Giudici
The inland transport sector plays a critical role in regions' and countries' competitive performance as it links international trade with local supply chains. This thesis focuses on inland container and bulk transport and studies three main solutions to improve the sector's performance: cooperation among transport operators that pool demand and share capacity; advanced transport planning models for reliable transport to tackle uncertainty; and matching models for digital transport marketplaces to improve the matching rate.

Longitudinal Studies in Travel Behaviour Research
Mathijs de Haas
To keep countries and cities accessible, attractive, safe and livable, policy makers aim to realize a mode shift away from the car. This thesis studies several mechanisms behind travel behaviour change towards sustainable travel modes, based on a large-scale longitudinal travel survey; the Netherlands Mobility Panel (MPN). The results provide policy makers with the knowledge needed to promote travel behaviour change towards a more sustainable mobility system.

Mind your passenger! The passenger capacity of platforms at railway stations in the Netherlands
Jeroen van den Heuvel
This thesis constitutes a first step towards measuring the passenger capacity of station platforms. First, it defines platform capacity on the basis of the locations of queues at exit escalators from platforms, the presence of passengers in the platform-edge danger zone and the duration of stops. It then renders capacity measurable using real-life data covering train stops and passenger behaviour on platforms.

Assessing Reference Dependence in Travel Choice Behaviour
Bing Huang
Reference dependence refers to a phenomenon that how people assess the outcome of a choice is largely determined by its comparison with the reference point; shifts of the reference point may give rise to reversals of preferences. This thesis aims to provide a more profound understanding of reference dependence in travel behaviour. It empirically assesses reference dependence using various travel choice data and provides new modelling tools and technologies to effectively model it.

Real-time Co-planning in Synchromodal Transport Networks using Model Predictive Control
Rie B. Larsen
Under the synchromodal transport paradigm, transport providers decide how freight is transported. Thereby, real-time information on the transport system can be used to integrate the routing decisions of both freight and vehicles to utilize the transport capacity well between multiple stakeholders. This dissertation proposes co-planning, where consciously chosen information is exchanged between cooperating partners that plan individually towards shared goals. In the dissertation multiple routing methods based on model predictive control are presented. The conclusions illustrate that co-planning can contribute to make freight transport more efficient and thereby alleviate the environmental impacts.

Cooperative Urban Driving Strategies at Signalized Intersections
Meiqi Liu
The integration between connected and automated vehicles and signal controllers can promote traffic efficiency, safety, and sustainability on urban roads. This thesis develops an optimization-based control framework for the purpose of optimizing vehicle trajectories under exogenous signals and jointly optimizing traffic signals and vehicle trajectories. The simulation results provide new insights into signal design and speed guidance for efficient traffic operations.

Data-Driven Modelling of Routing and Scheduling in Freight Transport
Ali Nadi Najafabadi
This thesis takes initial steps towards introducing a data-driven integrated logistics and traffic modelling framework. The main objective is to unravel the complex interaction between freight transport and traffic systems and to incorporate this knowledge into measures for improving the performance of traffic and logistics operations. Using large databases of observed truck trips and empirical research, a data-driven modelling pipeline is developed and applied, leading to new knowledge about the organization of road transport, in time and space.

Online Grocery Operations in Omni-channel Retailing: opportunities and challenges
Joydeep Paul
Online grocery has grown rapidly in different parts of the world over the last two decades. In this thesis we explore capacity sharing strategies between the vehicles of store replenishment and online fulfilment in buy-online-pickup- in-store omni-channel model. Through an extensive numerical study, we show that significant savings in distribution costs can be achieved by sharing capacity of vehicles across two channels. Alongside the planning aspects, we also study the interaction between the online and store channel in an omnichannel setting. Our results show that online profitability increases with household density and decreases with store density. We also find that that an increase in the popularity of the online channel could substantially impact the current dynamics to the point where it would be profitable to reduce the number of physical stores.

A Multiscale View on Bikeability of Urban Networks
Giulia Reggiani
Knowledge on how to evaluate the bikeability of an urban infrastructure network is scarce and ambivalent. This dissertation provides systematic knowledge on bicycle infrastructure networks and develops methodological tools to assess infrastructure-related bikeability. The findings can be used by urban planners and policy makers to develop more bicycle-friendly cities.

Energy-efficient Train Timetabling
Gerben Scheepmaker
Railways in Europe need to reduce the CO2 emissions and energy usage to contribute to sustainability. Two measures for railway undertakings, with low investment cost and both high reductions in CO2 emission and energy consumption, are energy-efficient train operation and incorporating this in the timetable design. This thesis develops and applies models for the energyefficient train trajectory optimization problem and for a multiple-objective timetable optimization problem.

Identifying Moral Antecedents of Decision-Making in Discrete Choice Models
Teodóra Szép
Discrete Choice Models (DCMs) are valuable tools for quantitative decisionmaking analysis: they allow analysts to better understand and predict choices and evaluate policies. However, they currently have a blind spot for morality. Moral values often play an essential role in decision-making, and in these instances, behaviour is often not aligned with crucial assumptions traditional DCMs are based on, such as preferences are stable and echo through choices or that decision-makers maximize their utility. This thesis aims to develop and test new DCMs that help to identify morality in a mathematically rigorous framework.

Wear Behaviour of A Convex Pattern Surface for Bulk Handling Equipment
Yunpeng Yan
This thesis aims to reveal the principles of the convex configuration on wear reduction for bulk handling equipment and to predict the surface deformation due to the contact with bulk material. The convex pattern surface reduces wear as it alters the flow behaviour of bulk material by strengthening the rolling and reducing the sliding of individual particles.

Model-based Control of Large-scale Baggage Handling Systems
Yashar Zeinaly
This thesis concerns model-based control design for automated large-scale baggage handling systems (BHSs) with special focus on optimal performance, energy consumption, computational complexity & scalability, and robustness of the proposed solutions. To this aim, the thesis uses tailor-made tools and methods from control and optimization theory and the theory of positive systems to arrive at low-complexity robust control algorithms that optimally transport the luggage through BHSs.

Ship Behavior in Ports and Waterways: An Empirical Perspective
Yang Zhou
This dissertation presents an empirical investigation of ship behavior in ports and waterways. The ship behavior in AIS data is identified as unhindered behavior distinguished by intrinsic ship characteristics incorporated with external impacts from static navigational infrastructures, dynamic environmental factors, and dynamic encounters with other ships. The findings provide systematic insights into the influencing mechanisms of the factors on ship behavior and direct to the development of a new maritime traffic model.

Appendix 2: TRAIL Staff Members on 31-12-2022

Name				University & faculty
Dr. ir.	N.A.H.		Agatz	Erasmus Universiteit Rotterdam -RSM
Dr.	J.A.		Annema	Technische Universiteit Delft-Fac. Techniek, Bestuur en Management
Prof. dr. ir.	B.	van	Arem	Technische Universiteit Delft-Fac. Civiele Techniek en Geowetenschappen
Dr.	B.		Atasoy	TU Delft- Fac. Werktuigbouwkunde, Maritieme Techniek & Technische Materiaalwetenschappen
Prof. dr. ir.	E.C.	van	Berkum	University of Twente-Fac. Engineering Technology
Dr. ir.	A.J.J.	van den	Boom	TU Delft- Fac. Werktuigbouwkunde, Maritieme Techniek & Technische Materiaalwetenschappen
Dr. ir.	P.		Buijs	Rijksuniversiteit Groningen-Fac. Economie en Bedrijfskunde
Dr.	O.		Cats	Technische Universiteit Delft-Fac. Civiele Techniek en Geowetenschappen
Prof. dr. ir.	C.G.		Chorus	TUD - Faculteit Industreel Ontwerpen
Dr.	A.		Coraddu	TU Delft- Fac. Werktuigbouwkunde, Maritieme Techniek & Technische Materiaalwetenschappen
Dr. ir.	G.		Correia	Technische Universiteit Delft-Fac. Civiele Techniek en Geowetenschappen
Dr. ir.	W.		Daamen	Technische Universiteit Delft-Fac. Civiele Techniek en Geowetenschappen
Dr.	A.		Dabiri	Technische Universiteit Delft-Fac. Civiele Techniek en Geowetenschappen
Prof. dr. ir.	B.		De Schutter	TU Delft- Fac. Werktuigbouwkunde, Maritieme Techniek & Technische Materiaalwetenschappen
Prof. dr. ir.	R.		Dekker	Erasmus Universiteit Rotterdam - Faculteit der Economische Wetenschappen
Dr.	H.F.		Farah	Technische Universiteit Delft-Fac. Civiele Techniek en Geowetenschappen
Prof. dr.	H.		Geerlings	Erasmus Universiteit Rotterdam - Faculteit der Sociale Wetenschappen
Prof. dr. ir.	K.T.		Geurs	University of Twente-Fac. Engineering Technology
Prof. dr.	R.M.P.		Goverde	Technische Universiteit Delft-Fac. Civiele Techniek en Geowetenschappen
Prof. dr.	M.P.		Hagenzieker	Technische Universiteit Delft-Fac. Civiele Techniek en Geowetenschappen
Prof. dr. ir.	R.		Happee	TU Delft- Fac. Werktuigbouwkunde, Maritieme Techniek & Technische Materiaalwetenschappen
Dr. ir.	A.		Hegyi	Technische Universiteit Delft-Fac. Civiele Techniek en Geowetenschappen
Prof. dr. ir.	R.E.C.M.	van der	Heijden	Radboud Universiteit Nijmegen - Faculteit der Managementwetenschappen

Prof. dr. ir.	J.		Hellendoorn	TU Delft- Fac. Werktuigbouwkunde, Maritieme Techniek & Technische Materiaalwetenschappen
Prof. dr. ir.	S.P.		Hoogendoorn	Technische Universiteit Delft-Fac. Civiele Techniek en Geowetenschappen
Dr.	M.		Janic	Technische Universiteit Delft-Fac. Civiele Techniek en Geowetenschappen
Dr.	X.		Jiang	TU Delft- Fac. Werktuigbouwkunde, Maritieme Techniek & Technische Materiaalwetenschappen
MEng, Dr. techn	P.		Jittrapirom	Radboud Universiteit Nijmegen - Faculteit der Managementwetenschappen
Dr.	V.L.		Knoop	Technische Universiteit Delft-Fac. Civiele Techniek en Geowetenschappen
Prof. dr.	M.B.M.	de	Koster	Erasmus Universiteit Rotterdam -RSM
Dr. ir.	M.		Kroesen	Technische Universiteit Delft-Fac. Techniek, Bestuur en Management
Dr. ir.	F.A.		Kuipers	Technische Universiteit Delft - Faculteit Electrotechniek, Wiskunde & Informatica
Prof. dr. ir.	J.H.		Kwakkel	Technische Universiteit Delft-Fac. Techniek, Bestuur en Management
Prof. dr. ir.	J.W.C.	van	Lint	Technische Universiteit Delft-Fac. Civiele Techniek en Geowetenschappen
Dr .	C.		Maat	Technische Universiteit Delft-Fac. Civiele Techniek en Geowetenschappen
Prof. dr. ir.	V.A.W.J.		Marchau	TRAIL Research School
Prof. dr.	M.H.		Martens	Technische Universiteit Eindhoven
Dr.	I.		Martinez	Technische Universiteit Delft-Fac. Civiele Techniek en Geowetenschappen
Prof.dr.	H.J.		Meurs	Radboud Universiteit Nijmegen - Faculteit der Managementwetenschappen
Dr.	E.J.E.		Molin	Technische Universiteit Delft-Fac. Techniek, Bestuur en Management
Prof. dr.	R.R.		Negenborn	TU Delft- Fac. Werktuigbouwkunde, Maritieme Techniek & Technische Materiaalwetenschappen
Prof. dr.	S.		Rasouli	Technische Universiteit Eindhoven
Dr.	J.		Rezaei	Technische Universiteit Delft-Fac. Techniek, Bestuur en Management
Prof. dr.	K.J.		Roodbergen	Rijksuniversiteit Groningen-Fac. Economie en Bedrijfskunde
Dr. ir.	D.L.		Schott	TU Delft- Fac. Werktuigbouwkunde, Maritieme Techniek & Technische Materiaalwetenschappen
Dr.	S.		Sharif Azadeh	Technische Universiteit Delft-Fac. Civiele Techniek en Geowetenschappen
Prof. dr. ir.	L.A.		Tavasszy	Technische Universiteit Delft-Fac. Techniek, Bestuur en Management
Prof. dr.	R.H.		Teunter	Rijksuniversiteit Groningen-Fac. Economie en Bedrijfskunde
Prof. dr. ir.	T.		Tillema	Rijksuniversiteit Groningen-Faculteit der Ruimtelijke Wetenschappen
Prof. dr.	H.J.P.		Timmermans	Technische Universiteit Eindhoven

Dr.	A.B.		Unal	Rijksuniversiteit Groningen - Faculteit der Gedrags- en Maatschappijwetenschappen
Dr.	E.		Ursavas	Rijksuniversiteit Groningen - Faculteit Bedrijfskunde
Dr.	W.W.		Veeneman	Technische Universiteit Delft-Fac. Techniek, Bestuur en Management
Dr.	J.		Veldman	Rijksuniversiteit Groningen-Fac. Economie en Bedrijfskunde
Prof. dr. ir.	A.		Verbraeck	Technische Universiteit Delft-Fac. Techniek, Bestuur en Management
Prof. dr.	I.F.A.		Vis	Rijksuniversiteit Groningen-Fac. Economie en Bedrijfskunde
Prof. dr.	D.	de	Waard	Rijksuniversiteit Groningen - Faculteit der Gedrags- en Maatschappijwetenschappen
Dr.	M.		Wang	Technische Universiteit Delft-Fac. Civiele Techniek en Geowetenschappen
Prof. dr.	G.P.	van	Wee	Technische Universiteit Delft-Fac. Techniek, Bestuur en Management
Prof. dr.	M.M.	de	Weerdt	Technische Universiteit Delft - Faculteit Electrotechniek, Wiskunde & Informatica
Dr.	S.X.		Zhu	Rijksuniversiteit Groningen-Fac. Economie en Bedrijfskunde
Prof. dr.	R.A.		Zuidwijk	Erasmus Universiteit Rotterdam -RSM

Appendix 3: Overview of TRAIL PhD projects on 31-12-2022

A. Transport & Mobility				
Uncertainty and Cost-Effectiveness of Policy Measures to Reduce CO2 Emissions from Transport	Robert	Kok	TUD	TBM
Analysis of Transportation Mode Between central City and New Towns using Activity-Based Approach	Jia	Guo	TUE	BE
SCRIPTS: A New Generation of Activity-based Models of Travel Demand	Anna-Maria	Feneri	TUE	BE
Policy Implications of Travel Time Budgets	Maarten	t Hoen	TUD	TBM
Activity Based Model of Travel Demand	Valeria	Caiati	TUE	BE
New Discrete Choice Theory for Understanding Moral Decision Making Behavior	Tom	Berg, van den	TUD	TBM
Exploring Ways to Incorporate Ethics in Artificial Moral Beings	Andreia	Martins Martinho Bessa	TUD	TBM
Transportation for Self-Organization trough Network Integration and Collaboration	Anique	Kuijpers	TUD	TBM
Exploring Impacts of Operations of a Fleet of Shared Autonomous Vehicles: agent-based simulation model	Senlei	Wang	TUD	EWI
Improving Sustainability of Regional Railway Services	Marko	Kapetanovic	TUD	CiTG
Parking Policy, Land Use and Sustainable Urban Transport: the case of the shopping trip	Jan-Jelle	Witte	EUR	ESE
Making Rail Freight Fit for the Future	Anuradha	Jain	RUN	NSM
Quantifying the Impact of Aviation CO2 Abatement Measures on Accessibility of International Passenger Air Transport	Sihyun	Yoo	TUD	TBM
Driver Expectations in Freeway Curve Driving	Johan	Vos	TUD	CiTG
Methods, Operations and Assessment of TRAIN-Centric Railway Signaling Systems	Joelle	Aoun	TUD	CiTG

Supply-side Operations and Behavioural Dynamics of the Ride-sourcing Systems in the Era of Mobility-as-a-Service (MaaS)	Peyman	Ashkrof	TUD	CiTG
Road Safety for Cyclists in Dutch Cities	Teun	Uijtdewilligen	UT	CTW
Participatory Value Evaluation for Renawable Energy Projects	Ignacio	Hernandez	TUD	TBM
Societal Costs and Benefits of Public Participation in Transportation and Planning	Sander	Barneveld, van	TUD	TBM
Port Development Studies in Archipelo Country (case study Indonesia)	Arry	Destyanto	TUD	TBM
Automated Shuttles as Part of a Public Transport Network	Irene	Zubin	TUD	CiTG
Data-driven Optimization Models for Transportation Problems	Mahsa	Farhani	TUD	TBM
Planning and Operation of Future Taxi System: Routing Model of Heterogeneous Vehicles in Mixed Autonomous and Non-autonomous Zone Networks	Qiaochu	Fan	TUD	EWI
Advancing Smart and Healthy City Trough New Mobility Choices: exploring individual's preferences between e-bikes, shared mobility, and Mobility as a Service (MaaS)	Xueting	Ren	TUE	BE
Companies' Adoption of Autonomous Trucks	Shao	Mengru	TUE	BE
Incorporating Stochastic Demand Forecasting Model into Model of Optimal Demand Responsive Transport Services Operations	Shangqi	Li	TUE	BE
Smart Connected Bikes	Georgios	Kapousizis	UT	ET
Supporting Sustainable Mobility Transition by Analysing Government - Mobility Provider Interaction	Ruben	Akse	RUN	NSM
Participative Exploratory Modelling of Mobility System Transitions	Karoline	Fuehrer	TUD	TBM
Consumers on the Move - Investigating the Interaction between Government and Consumers Regarding Innovations in Sustainable Mobility	Jaap	Van der Waerden	RUN	NSM
Artificial Intelligence for Sustainable Real-Time Transportation Systems	Pedro	Zattoni Scroccaro	TUD	3ME
Optimizing Performance of Automatic Train Operation on Railway Networks	Ziyulong	Wang	TUD	CiTG
Scalable, Modular and Fault Tolerant Control for Intelligent Marine Vessels	Nikolaos	Kougiatsos	TUD	3ME

Design and Evaluation of Interfaces for Smart Connected Bikes	Mario	Boot	UT	CTW
Optimal Real-Time Traffic Management of Train-Centric Railway Operations	Nina	Versluis	TUD	CiTG
Developing Adaptive Sustainable Urban Mobility Plans (ASUMPs)	Maha	Attia	RUN	NSM
Development and Applications of Swarm Intelligence for Tradable Mobility Rights and Planning of New Mobility Services	Jesper	Provoost	TUD	CITG
Discrete Element Modelling to enable Optimal Blast Furnace Charging (DEM-OC)	Ahmed	Hadi	TUD	3ME
Anxiety Disorders and Transport Problems	Christian	Ratering	RUN	NSM
Understanding the Relationships among Urban Space, Urban Perceptions, and their Impact on In-person Social Interactions	Francisco	Garrido-Valenzuela	TUD	TBM
Robust train trajectory optimization	Alex	Cunillera	TUD	CiTG
Vehicle Coordination in Urban Traffic: a perspective from human behaviour and decisions	Yiru	Jiao	TUD	CiTG
Mobility Hubs for Inclusive and Sustainable Accessibility in Low-Dense Contexts	Tibor	Rongen	RUG	SS
Multidimensional wellbeing and participatory value evaluation (PVE	Martijn	Vries, de	TUD	TBM
Dimensioning On-Demand Multimodal Micro-Mobility Sharing Systems	Sara	Momen	TUD	CiTG
Towards Safe Navigation: human-maritime autonomous surface ship interaction in a mixed waterborne transport system	Rongxin	Song	TUD	TBM
New home, new travel habits? Understanding the process of (un)sustainable travel choices and car ownership of new residents of (new) urban neighbourhoods in the Netherlands.	Tessa	Leferink	TUE	IE&IS
Towards Safe Mobility for All: a data-driven approach	Angèle	Picco	RUG	B&SS
Cooperative Port: Vessel service providers perspective	Shahrzad	Nikghadam	TUD	TBM
Integrated Micro and Macroscopic Methods for Safe and Efficient Traffic of Connected Vulnerable Bicyclists and Automated Vehicles	Christoph	Schmidt	TUD	3ME
Understanding Urban Noise Pollution with Machine Learning	Lion	Cassens	TUD	TBM

B. Infrastructure & Traffic Management				
Travel Behaviour and Traffic Operations in Case of Exceptional Events	Mahtab	Joueiai	TUD	CiTG
STAQ: Static Traffic Assignment with Queuing	Luuk	Brederode	TUD	CiTG
Crowd Behaviour under Exceptional Conditions	Erica	Kinkel	TUD	CiTG
The Design of High-Speed Railway Passenger Service Plans from a Multimodal Transport Perspective	Fei	Yan	TUD	CiTG
Airline/ATM Network Performance and Optimization	Yalin	Li	TUD	L&R
Connected Driver Assistance and Traffic Management	Niharika	Mahajan	TUD	CiTG
Cross Project Learning by an International Project Base of Large Infrastructure Projects	Yan	Liu	TUD	CiTG
Online Route Planning in Response to Non-Recurrent Traffic Disruptions	Oskar	Eikenbroek	UT	CTW
Creative Re-Designing of Urban Public Space in the Era of Automated Driving, Vehicle Sharing and Electrification	Maryna	Ozturker	TUD	CiTG
Sensing Platform: monitoring, modeling and forecasting urban mobility trough interactions of connected autonomous vehicles and active modes	Alphonse	Vial	TUD	CiTG
Understanding Traveller Behaviour under Choices in the Context of Public Transportation using a Combination of Data Sources	Sanmay	Shelat	TUD	CiTG
Advanced Traffic Management Strategies to Improve the Reliability of Port-to-Hinterland Freight Operations	Salil	Sharma	TUD	CiTG
Real-time Forecasting of Large-scale Crowd Movements	Martijn	Sparnaaij	TUD	CiTG
Accessibility and Road safety: Integration of road safety indicators into accessibility analysis and planning	Merhnaz	Asadi	UT	ET
Improvement of the Utrecht Public Transport system by the Integration of Modes	Roy	Van Kuijk	TUD	CiTG
Performance and Safety Evaluation of Dedicated Lanes for Automated and Connected Vehicles	Solmaz	Razmi Rad	TUD	CiTG
Optimizing Blended Learning in Higher Education from a carbon Footprint Perspective	Marieke	Versteijlen	TUD	TBM
Urban Traffic Estimation and Prediction Methods: the added value for urban traffic control	Muriel	Verkaik-Poelman	TUD	CiTG

The Impact of Built Environment on Individual Health, with Weight Status as the Indicator	Hong	Yan	TUD	TBM
Traveller Preferences and Behavioural Dynamics in the Era of MAAS	Nejc	Gerzinic	TUD	CiTG
Multi-scale Demand Estimation/Prediction	Zahra	Eftekhar	TUD	CiTG
Transition Phases and Tipping Points in MaaS Provision	Arjan	De Ruijter	TUD	CiTG
Multi-scale Estimation and Prediction of Traffic Dynamics	Guopeng	Li	TUD	CiTG
Mobility and Perceptions of Accessibility in Peripheral Rural Areas	Felix	Pot	RUG	SS
Human Drivers Behaviour and Modelling in Mixed Traffic	Nagarjun	Reddy	TUD	CiTG
Digital Divide in Tranport Services and Transport Disadvantage	Anne	Durand	TUD	CiTG
Automated Vehicles Operational Design Domain	Dong	Jongqi	TUD	CiTG
Studying the Impact of Crowd Management Measures in Crowded Pedestrian Spaces using Field Studies	Lucia	Schaik, van	TUD	CiTG
Improving Travel Demand Model ALBATROSS: a learning-based transportation oriented simulation system	Pim	Labee	TUE	BE
AI Decision Support for Designing Next-Gen Cities	Lucas	Spierenburg	TUD	CiTG
Modelling and Distributed Control for the Integration of Railway Traffic Management and Train Control	Xiaoyu	Liu	TUD	3ME
Methodological Development and Modelling of Human Cognitive Interactions in Traffic Simulation for Automated Driving	Kexin	Liang	TUD	CiTG
The Impacts of Shared Mobility on Multimodal and Inclusive Traffic Accessibility	Luqi	Dong	UT	ET
Operationalisation of 'Broad Welfare/Well-being into a Transport Policy Context	Marco	Burgsteden, van	UT	ET
Behavioural Aspects of Hyper-connectivity in Urban Last-mile Logistics	Merve	Cebeci	TUD	CiTG
The Impact of Various IT-based Crowd Management Measures for Crowded Pedestrian Infrastructures	Arco	Beek, van	TUD	CiTG
Traffic Modelling and Impact Assessment for Sustainable Integrated Traffic Management	Ahmed	Khaqan	TUD	CiTG

Traffic Impact Assessment Considering Connected and Autonomous Vehicles	Saeed	Rahmani	TUD	CiTG
Traffic Heterogeneity with Connectivity and Connected Automated Vehicles	Xue	Yao	TUD	CiTG
Flexible Railway Timetabling with Demand-driven Train Service Variations	Renate	Van der Knaap	TUD	CiTG
Transit Oriented Development as an Inclusive and Just Transport Planning Approach: a look into the trips of full-time homemakers through the cases of Hong Kong and the Netherlands	Ki Fung	Yip	RUG	SS
An econometric framework to analyze two-sided markets: A case study of Mobility-on-Demand (MOD) services	Subodh	Dubey	TUD	CiTG
Multi-Objective Dynamic Geo-Fencing in Metropolitan Transportation Networks	Nirvana	Pecorari	TUD	CiTG
UNRAVELED: UNderstanding tRAffic effects on paVement ravELing by fiEld Data	Zili	Wang	TUD	CiTG
Meaningful Human Control	Lucas	Suryana	TUD	CiTG
Research on Decision-making Method of Smart vehicle Driving Behavior	Jingyang	Zhao	TUD	CiTG
Self-Organizing Modelling for Railway Traffic Management	Konstantinos	Rigos	TUD	CiTG
Human-like Driving Behaviour Model	Yuxia	Yuan	TUD	CiTG
Interactive Multiscale Visualization of Mobility Networks	Saman	Behrouzi	TUD	CiTG
Data-driven Prediction of Multimodal Urban Traffic Operation with Distributed Learning	Xiamei	Wen	TUD	CiTG
Fault Diagnosis for safe Control and Coordination of Inland Waterway Interconnected Systems	Abhishek	Dhyani	TUD	3ME
Providing routing strategies for e-hailing drivers and pricing strategies for e-hailing platforms to maximize the total expected reward in the presence of market competition and stochasticity in the reward function using predict + optimize method.	Elif	Arslan	TUD	CiTG

C. Logistics and Transport Organisation				
Modelling and Optimization on Local Traffic Networks	Yu	Hu	TUD	3ME
Performance Interaction Model	Alf	Smolders	TUD	CiTG
Supply Chain Disruption Management	Bahareh	Zohoori	TUD	TBM
Collaboration Mechanisms Design for Green Supply Chain	Kailan	Wu	TUD	TBM
Sustainable City Logistics and Urban Consolidation Centres	Anna	Dreischerf	RUG	E&B
Incentive Design in Socially Responsible Supply Chain Management	Hamed	Vafa Arani	EUR	RSM
Network Performance under Emergent Behaviour in Hinterland Container Shipping: a complex network perspective	Camill	Harter	EUR	RSM
The Structure of Power and Decision-Making in Dyadic Supply Chains	Kartika	Nurhayati	TUD	TBM
Multi-Objective Optimization for Maritime and Hinterland Transportation	Yimeng	Zhang	TUD	3ME
The Impacts of Collaboration on Resource Utilization in Warehouses	Negin	Jamili	EUR	RSM
Supply Chain Visibility with Sparse Data	Isabelle	Schilt, van	TUD	TBM
Logistics Models for Improving the Efficiency of Ports and Inland Waterways	Adrien	Nicolet	TUD	3ME
Designing Sustainable Attended Home Delivery Services in E-Grocery	Liana	Hagen, van der	EUR	RSM
Collaboration for a Resillient and Decarbonized Maratime Industry 4.0	Xiaohuan	Lyu	TUD	3ME
Development of and Optimized Operation and Maintenance Strategy of Offshore Wind Farms	Mingxin	Li	TUD	3ME
Dynamic and Stochastic Models for Optimization of Transport Operations over Water	Cigdem	Karademir	TUD	3ME
Optimization of resource positioning in networks with uncertain and limited real-time data	Irene	Droffelaar, van	TUD	TBM
Routing and Network Design for the Hydrogen Economy	Umur	Hasturk	RUG	E&B

Leveraging New Technologies and Data Sources to Enhance Material Handling Effiency	Mahdi	Ghorashi Khalilabadi	EUR	RSM
Simulation of flow and packing behaviour of multi-component mixtures	Raïsa	Roeplal	TUD	3ME
Sharehouse: Human-Technology interaction in warehouse environments	Mahsa	Alirezaei	EUR	RSM
Optimization of Maritime Transportation System Performance to Reduce Regional Development Disparity in Archipelagic Country (Case Study: Indonesia)	Lisna	Rahayu	RUG	SS
Design of Soft Grasping Gripper with Actively Stimulated Particles	Qianyi	Chen	TUD	3ME
Decision-making for Reliable Supply Chains	Yvonne	Lont	TUD	TBM
Application of Metaheuristic Algorithms in Optimization Problems and Intersection with Machine Learning	Stelios	Nikolakakis	RUG	E&B
Hydrogen-based Vessels Data Analysis and Analytics for Control and Condition Monitoring of Primary Onboard Systems	Esma	Özdemir	TUD	3ME
Intelligent Power and Energy Management System for DC Energy Distribution Systems for Methanol-Fuelled Ships	Charlotte	Loeffler	TUD	3ME
Cooperative Control	Xin	Xiong	TUD	3ME
Operation & Maintenance Optimization of Offshore Wind Farms	Marco	Borsotti	TUD	3ME
Simulation and Analysis of Sustainable Methanol-fueled Marine Internal Combustion Engines	Konstantinos	Zoumpourlos	TUD	3ME
Towards Net-zero Emissiion Port Operations	Xinyu	Tang	TUD	3ME
Storage, Handling, and Bunkering of Solid Hydrogen Carriers	Marcel	Benten, van	TUD	3ME

*** Themes**

1. Transport & Mobility
2. Infrastructure & Traffic
3. Logistics

**** Abbreviations**

TUD Delft University of Technology
EUR Erasmus University Rotterdam
RU Radboud University Nijmegen
UT University of Twente
TUE Eindhoven University of Technology
RUG University of Groningen