

# Year Report 2019 TRAIL Research School

**TRAIL Research School, March 2020** 

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## Selected Highlights TRAIL Research School 2019

- 16 PhD-students received their PhD-degree
- 25 new PhD-students started at TRAIL
- 10 TRAIL PhD courses and 6 PhD master classes
- 5 GP-OML courses
- An international PhD Summer school on Cycling in Cities
- The yearly TRAIL PhD congress in Utrecht
- The 25th Anniversary of TRAIL
- 6 Masterclasses and a Summer school for I and W policymakers
- 2 PhD Theses sessions and 2 special topics sessions for I and W policymakers



## 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 31-12-2019 TRAIL counted 70 Staff members, 4 associated staff members, and 138 PhD candidates (see Appendices 2 and 3). The organizational structure of TRAIL Research School consists of the following bodies:<sup>1</sup>

- 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. Board of Faculty Representatives, consisting of representatives of all participating faculties (1 staff member per faculty)
- 5. PhD Council, consisting of six 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 2020 and further is presented.

<sup>&</sup>lt;sup>1</sup> See <u>www.rstrail.nl</u> for the current members of the different bodies

## 2. Training & Education

Training & Education is the core activity of the TRAIL Research School. In 2019 TRAIL performed the following activities:

- The organization of 10 PhD courses and 6 seminars
- The organization of the 4<sup>th</sup> 1.5-year cycle of the graduate program with Research School Beta on Operations Management and Logistics (GP-OML)

### 2.1 TRAIL courses and seminars in 2019

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 considered to be 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)). TRAIL has intensified the cooperation with these (and other) institutes.

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

- TRAIL welcomes all PhD students (TRAIL and non-TRAIL<sup>2</sup> PhD students) for following courses.
- At a minimum, PhD students who follow only 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.

<sup>&</sup>lt;sup>2</sup> 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: <u>info@rstrail.nl</u>

Table 1: TRAIL T&E course program (March 2019)

Introduction to TRAIL and the PhD student process (0.5d) (Marchau & Van Wee)	TRAIL	S	0.25	0.5	discipline/ research
I TRAIL Basic Courses <sup>0,1</sup>	By	Part <sup>2</sup>	ECTS <sup>3</sup>	TUD GS credits <sup>3,4</sup>	TUD GS category
TRAIL Fundamental Domain Knowledge – (4d) <sup>5</sup> (Annema & Van Wee)	OML	D	1 - 4	4 - 5	discipline
TRAIL Theories and Methods (3d) (Marchau & others)	TRAIL	Т, М	1 - 3	3 - 5	discipline/ research <sup>6</sup>
	_			TUD GS	TUD GS
II General TRAIL Courses <sup>1</sup>	By	Part <sup>2</sup>	ECTS <sup>3</sup>	credits <sup>3,4</sup>	category
TRAIL Data-analysis and Statistics (3d) <sup>5</sup> (Kroesen & Molin)	TRAIL	S	1 - 3	3 - 5	discipline/ research
Machine Learning (4d) 5 <i>(Van Hoesel)</i>	OML	М	1 - 4	4 - 5	discipline/ research
TRAIL Writing a Literature Review in the TIL Domain (2d) ( <i>Van Wee</i> )	TRAIL	S	1 - 4	2 - 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 (3d) (Chorus & Van Cranenburgh)	TRAIL	т	2	3	discipline/ research
Stated Choice Data Collection (Rasouli & Caiati)	TRAIL	М	1	2	discipline/ research
Transport Innovations (1d) (Annema, Geerlings & Wiegmans)	TRAIL	D	1 - 2	1 - 3	discipline
III TRAIL Specialisation Courses <sup>1</sup>	Ву	Part 7	ECTS <sup>3</sup>	credits <sup>3,4</sup>	category
Traffic Flow Phenomena (3d)	TRAIL	I	1 - 3	3 - 5	discipline
Behavioural Aspects in Transport (1d) (De Waard & Veldstra)	TRAIL	Ι	0.5 – 1	1 - 2	discipline
Transport Logistics Modelling (4d) <sup>5</sup> (Tavasszy & Zuidwijk)	OML	L	1 - 4	4 - 5	discipline/ research
Facility Logistics Management (4d) <sup>5</sup> (Adan & De Koster)	OML	L	1 - 4	4 - 5	discipline
Quantitative Modelling and Analysis of Supply Chains (4d) <sup>5</sup> ( <i>De Kok</i> )	OML	L	1 - 4	4 - 5	discipline/ research
Advanced Inventory Theory (4d) <sup>5</sup> (Dekker & Van Houtum)	OML	L	1 - 4	4 - 5	discipline
Freight Transport Management (4d) <sup>5</sup> ( <i>Vis &amp; Coelho</i> )	OML	L	1 - 4	4 - 5	discipline
Passenger Transport Systems (4d) <sup>5</sup> (Cats & Schmidt)	OML	L	1 - 4	4 - 5	discipline

Legend to table 1

Yearly
Every 1,5 years
Every 2 years

- <sup>0</sup> Mandatory courses for the TRAIL Diploma
- <sup>1</sup> Between brackets number of course days
- <sup>2</sup> D = Domain Knowledge
  - T = Theory
  - M = Methodology
  - S = Skills
- <sup>3</sup> First number = participated in course second number = participated in course & passed assignment/exam
- <sup>4</sup> The Promotor decides about the number of TUD GS credits to be administered in DMA
- <sup>5</sup> Courses given by TRAIL and Research School Beta within the Graduate Program Operations Management and Logistics
- (GP-OML).
- <sup>6</sup> PhD student can choose either category, since TRAIL 'methodology' and 'skills' courses are strongly linked to the TRAIL 'discipline'
- <sup>7</sup> T: Transport, I: Infrastructure, L: Logistics

Table	2:	TRAIL	courses	given	in	201	9
				5		-	-

2019 – TRAIL courses				
Title	Start date	No. days	Course leader(s)	ECTS
Introduction to TRAIL and the PhD student Process	21 Jan.	0.5	Marchau & Van Wee	0.25
TIL Theories and Methods	4 March	3	Marchau, Van Wee, Cats, Kwakkel, Molin	1 - 3
Stated Choice Data Collection	4 & 5 April	1.5	Rasouli & Caiati	1
Behavioural Aspects in Transport: introduction to traffic psychology	7 May	1	De Waard & Veldstra	0.5 - 1
Writing a Literature Review in the TIL Domain	14 Feb.	2	Van Wee & Scheepmaker	1 - 4
Deep Learning Demystified	5 & 6 Jun.	1.5	Van Gent, Kayhan & Van Gemert	1.5 - 2
Societal Relevance of your PhD Research	16 Sept.	1	Annema, Van Wee & Reiding	0.25 - 1
Data-analysis and Statistics	7, 10 & 15 Oct.	3	Kroesen & Molin	1 - 3
Writing and Publishing a 'TRAIL' Research Article	24 Oct.	1	Geurs & Rezaei	0.5 - 1
From Horse to Porsche: innovations in transport and logistics	8 Nov.	1	Annema, Geerlings & Wiegmans	1 -2

Table 3: TRAIL/Beta GP-OML courses given in 2019
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2019- GP-OML courses								
Title	Start date	No. days	Course leader(s)	ECTS				
Facility Logistics Management	13 Feb.	4	De Koster & Adan	1 - 4				
Quantitative Modelling and Analysis of Supply Chains	13 Mar.	4	De Kok	1 - 4				
Freight Transport Management	15 May	4	Vis & Coelho	1 - 4				
Capita Selecta: Data Driven Decision Models	11 & 18 Sept.	2	Kulkarni	0.5 - 2				
Fundamental Knowledge in Transport, Infrastructure and Logistics	2 & 9 Oct.	2.5*	Anne & Van Wee	1 - 4				
Advanced Inventory Theory	30 Oct.	2**	Dekker & Van Houtum	1 - 4				
Capita Selecta: Sustainable Operations Management	13 Nov. & 11 Dec.	2	Tan & Akkerman	0.5 - 2				
Capita Selecta: Emergency Service Logistics	25 Sep. & 16 Oct.	***	Van der Mei	0.5 - 2				

\* because of limited number of participants: 2,5 days instead of 4

\*\* because of limited number of participants: 2 days instead of 4

\*\*\* because of the limited number of participants - no meetings | slides via e-mail

In addition, regular seminars by (inter)national renowned scholars are offered by TRAIL (see Table 4). TRAIL organizes these seminars in the 'slipstream' of public defenses of PhD's on topics related to the PhD dissertation and with input of (often international) scientists that are member of the promotion committee. Also, seminars are organized on the occasion of visiting leading academics (see Table 5).

Table 4: TRAIL seminars associa	ated with PhD defenses in 2019
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2019 – TRAIL seminar: public defence								
Title	Date	No. days	Lecturers					
Traffic Flow Estimation: applying simulation models and data estimation methods	19 March	0.5	Viti, Chung, Stoter & Fellendorf					
How to Provide a Better ITT Service in the Port?	1 July	0.5	Tierney, Voss, Dekker & Hu					
Modelling Travel Behaviour	17 Sept.	0.5	Mokhtarian, Cherchi, Bekhor & Van Wee					
Optimization Models for Transportation Problems	30 Sept.	0.5	Antunes, Agatz, Kun An					
Passenger and Disruption Management	16 Dec.	0.5	Goverde, Huisman & Nielsen					

Table 5: TRAIL seminars associated with visiting researchers

2019 – TRAIL seminar: visiting researcher/other									
Title	Date	No. days	Lecturers						
Railway Operations Fundamentals	22 Nov.	0.5	Soeser						

### 2.2 Graduate Program – Operations Management and Logistics

The 1.5 year Operations Management and Logistics (OML)-program started early 2014. The OML-program is a joint effort of the research schools TRAIL and Beta 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 1.5 year 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.

In 2018, the Program Board of GP-OML decided to adjust the program to a cycle of 2 years. As such, lecturers can give their course every two years in the same semester and PhD students know in which year and in which semester a course is provided. Note that a 2-year program offers the opportunity to provide some courses on a yearly basis (basic domain courses for PhD students or methodological courses) while other courses can be offered every two years.

#### 2019 - 2020

Fall semester

- Fundamental Knowledge on Transport, Infrastructure and Logistics
- Advanced Inventory Theory
- Capita Selecta: Sustainable Operations Management
- Capita Selecta: Emergency Logistics

Spring semester

- Machine Learning
- Transport Logistics Modelling
- Passenger Transport Systems: Networks, Operations and Behavioral Models

#### 2020 - 2021

Fall semester

- Fundamental Knowledge on Transport, Infrastructure and Logistics
- Quantitative Modelling and Analysis of Supply Chains
- Capita Selecta: Behavioral Operations Management
- Capita Selecta: Empirical Research in Supply Chain Management

#### Spring semester

- Machine Learning
- Freight Transport Management
- Facility Logistics Management

### 2.3 Evaluation results

A recent evaluation of the TRAIL T&E program over the period 2014-2019 revealed the following:

- Most basic and specialization courses are given on a regular basis (i.e. once every 1 1.5 year).
- Courses that are given less frequent/cancelled involve specialization courses (e.g. Transport Innovations, Behavioral Aspects in Transport, Facility Logistics Management, Operations Research and Health Care, Public Transport, Transport Policy Analysis).
- Over the last three years no courses have been cancelled or postponed.
- Most courses have about 10 or more participants (informal threshold for giving a course of 1 ECTS or more); in total 1044 participants followed a TRAIL courses (incl. GP\_OML courses. Average number per course is 13 participants.
- Most courses are graded highly by the students (between 7.5 and 8.5). Masterclasses on specific topics are very well attended.

The emphasis has moved to increasing the quality of courses given. 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).

year	average grade all courses
2013	7.8
2014	7.6
2015	8.2
2016	8.4
2017	7.9
2018	8.5
2019	8.3

### 2.4 The TRAIL Graduate School program (2014-2019)

Bert van Wee (TRAIL), Hans van Lint (TUD/TIL), and Vincent Marchau (TRAIL) successfully applied in 2013 for a NWO Graduate Program (GP) grant. This enabled 5 excellent MSc students within the domain of Transport, Infrastructure and Logistics to pursue their career as a PhD student within TRAIL. Students were free to choose their subject and promotor within the TRAIL community. PhD students have two thesis supervisors ('promotors') at two different TRAIL-universities.

Five PhD students have (almost) finished their PhD :

- Mariska van Essen (UTwente/TU Delft) (2018), 'The Potential of Social Routing Advice.
- Fanchao Liao (TU Delft/UTwente) (2019), Electric Vehicles, Business Models and Consumer Choices.
- Konstanze Winter (TU Delft/RU) (tbc) Shared Mobility, Car Ownership and Urban Parking Management
- Paul van Erp (TU Delft/UT) (2020) Relative Flow Data: new opportunities for traffic state estimation
- Yihong Wang (TU Delft/TUE) (tbc) Using new big data sources to inform travel demand models

### 2.5 Origins of PhD students

The Table below indicates the origin of starting TRAIL PhD students within the period of 2010-2019. The figures show that after strong increases in TRAIL PhD students in 2015 and 2016, 2019 marked again an average year of inflow. This is related to varying research funding opportunities over different years (e.g. NWO);

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

### 2.6 TRAIL Training and Education outlook

The education activities mentioned in section 2.1-2.3 will be continued in 2020 and further. In addition, two Video Clips will be developed, one on "TRAIL-Theories and Methods" and one on "How to review a TIL paper". In addition, TRAIL organizes an International Summer School for PhD students on Automated Driving in 2020.

#### 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 ManagementB. 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 2019, 16 TRAIL PhD students received a PhD degree (see Table 5). In Appendix 1 the summaries of these theses are given.

Table 6: TRAIL PhD theses 2019

Tit	le	Name	University <sup>1</sup>	Month of Defense
1.	Information Integration and Intelligent Control of Port Logistics System	Fan Feng	DUT	January
2.	Green Bulk Terminals: A strategic level approach to solid biomass terminal design	Ioannis Dafnomilis	DUT	January
3.	Controlled Perishable Goods Logistics: Real-time coordination for fresher products	Xiao Lin	DUT	January
4.	Railway Wheel Defect Identification	Alireza Alemi	DUT	January
5.	A Novel Design of the Transport Infrastructure for Traffic Simulation Models	Guus Tamminga	DUT	March
6.	Consumers, Business Models and Electric Vehicles	Fanchao Liao	DUT	Мау
7.	Sustainability of Deep Sea Mining Transport Plans	Wenbing Ma	DUT	June
8.	Toll Roads in Indonesia: transport system, accessibility, spatial and equity impacts	Ayu Andani	UT	June
9.	Container Transport inside the Port Area and to the Hinterland	Qu Hu	DUT	July
10.	Traffic Management Optimization of Railway Networks	Xiaojie Luan	DUT	July
11.	Vessel Route Choice Model and Operational Model Based on Optimal Control	Yaqing Shu	DUT	September

12. Unravelling Mode and Route Choice Behaviour of Active Mode Users	Danique Tan	DUT	September
13. Planning and Operation of Automated Taxi Systems	Xiao Liang	DUT	September
14. Spatial Dependence in Travel Demand Models: Causes, implications, and solutions	Kasper Kerkman	RU	October
15. Cooperative Multi-Vessel Systems for Waterborne Transport	Linying Chen	DUT	November
16. Passenger-Oriented Timetable Rescheduling in Railway Disruption Management	Yongqui Zhu	DUT	December

<sup>1</sup> DUT – Delft University of Technology UT – University of Twente RU – Radboud University Nijmegen

In 2019, 25 PhD students started at TRAIL. Table 6 gives an overview of these new projects.

Table 6: Newly started PhD students at TRAIL in 2019

PhD		Title Research	Univ.	Faculty	Finance source
Joelle	Aoun	Methods, Operations and Assessment of TRAIN-Centric Railway Signaling Systems	TUD	CiTG	EU Shift 2 Rail
Peyman	Ashkrof	Supply-side Operations and Behavioural Dynamics of the Ride-sourcing Systems in the Era of Mobility-as-a-Service (MaaS)	TUD	CiTG	European research Council & AMS
Sander	van Barneveld	Societal Costs and Benefits of Public Participation in Transportation and Planning	TUD	ТВМ	
Arry	Destyanto	Port Development Studies in Archipelo Country (case study Indonesia)	TUD	TBM	LPDP Scholarship
Anna	Dreischerf	Sustainable City Logistics and Urban Consolodation Centres	RUG	E&B	
Zhe	Du	Clustered control for unmanned surface vessels	TUD	3ME	China Scholarship Council
Zahra	Eftekhar	Multi-scale Demand Estimation/Prediction	TUD	CiTG	MIRROR
Nejc	Gerzinic	Traveller Preferences and Behavioural Dynamics in the Era of MAAS	TUD	CiTG	AMS
Camill	Harter	Network Performance under Emergent Behaviour in Hinterland Container Shipping: a complex network perspective	EUR	RSM	
Ignacio	Hernandez	Participatory Value Evaluation for Renawable Energy Projects	TUD	TBM	
Dong	Jongqi	Automated Vehicles Operational Design Domain	TUD	CiTG	NWO
Zongchen	Li	Surface Crack Growth in Rigid Pipe Reinforced with FRP	TUD	3ME	China Scholarship Council
Guopeng	Li	Multi-scale Estimation and Prediction of Traffic Dynamics	TUD	CiTG	
Xiao	Li	An Integrated Analytical Moel for Predicting the Collapse Pressure of Flexible Risers in Ultra-Deep Water	TUD	3ME	China Scholarship Council
Andrike	Mastebroek	Effectiveness and Acceptability of a Peak Pricing Scheme on Passenger Rail	TUD	TBM	NS
Kartika	Nurhayati	The Structure of Power and Decision-Making in Dyadic Supply Chains	TUD	TBM	LPDP Scholarschip
Felix	Pot	Mobility and Perceptions of Accessibility in Peripheral Rural Areas	RUG	SS	
Nagarjun	Reddy	Human Drivers Behaviour and Modelling in Mixed Traffic	TUD	CiTG	NWO
Arjan	de Ruijter	Transition Phases and Tipping Points in MaaS Provision	TUD	CiTG	ERC grant
Teun	Uijtdewilligen	Road Safety for Cyclists in Dutch Cities	UT	CTW	SWOV
Hamed	Vafa Arani	Incentive Design in Socially Responsible Supply Chain Management	EUR	RSM	

Johan	Vos	Driver Expectations in Freeway Curve Driving	TUD	CiTG	
Hong	Yan	The Impact of Built Environment on Individual Health, with Weight Status as the Indicator	TUD	ТВМ	China Scholarship Council
Sihyun	Yoo	Quantifying the Impact of Aviation CO2 Abatement Measures on Accessibility of International Passenger Air Transport	TUD	ТВМ	Sefl funded
Yimeng	Zhang	Multi-Objective Optimization for Maratime and Hinterland Transportation	TUD	3ME	China Scholarship Council
Irene	Zubin	Automated Shuttles as Part of a Public Transport Network	TUD	CiTG	

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.

## 4. Knowledge Transfer

### 4.1 Ktrans highlights 2019

#### TRAIL PhD Congress 2019

On November 28 the yearly TRAIL Congress took place in Grand Hotel Karel V in Utrecht: about 25 presentations were given, 60 PhD students and 5 staff members joint in and the atmosphere was very good. We all enjoyed it very much.

The congress was again highly rated by an 8.5 by the participants (response rate: 50%) – which is very high for a congress. TRAIL is very proud with this result.

The participants considered that acquiring experience in presenting and discussing the research by PhD Students, meeting colleagues and relations and strengthening the relation among peers within TRAIL as very successful. Also the concept of having an "open" conference - meaning that PhD students could (also) present initial research ideas, work in progress, etc. – was well appreciated. The congress sessions were very much appreciated (rate 8.2). Also the venue (location, food, rooms) was appreciated by grading an 9.

#### TRAIL/IenW cooperation

As part of the collaboration between the Ministry of Infrastructure & Water management and TRAIL, two meetings were organized in which policy relevant PhD theses were presented and discussed:

- 21/03/2019 (Bert van Wee) TRAIL Lunchlezing beleidsrelevante inzichten op het gebied van verkeersveiligheid
- 03/10/2019 (Prof. Lori Tavasszy, Prof. Vincent Marchau): TRAIL Lunchlezing: beleidsrelevante inzichten uit doctoraatsonderzoek over goederen vervoer

Two meetings were organized on specific, relevant topics in the TIL-domain (in Dutch):

- 09/04/2019 (Prof. Bert van Wee, Prof. Bart van Arem, Dr. Rob Goverde en Dr. Oded Cats) verdiepingssessie de capaciteit van het verkeers- en vervoerssysteem
- 21/06/2019 (Prof. Bert van Wee, Prof. Erik Verhoef, Dr. Jan Anne Annema) verdiepingssessie Kennis voor klimaat
- 02/07/2019 One in-house course "modelling" was organized by Bert van Wee:



TRAIL/TUD DIMI lenW Summer school "Naar een klimaatbestendig Nederland | spel & spelers"

In 2019 we do not only want to protect people and the environment from health and environmental risks; we prefer that the products and services in the lenW domain add value - something extra - and we are inspired by nature. That was the final image that the

Summerschool 2019 (Sep 2-5) produced. About thirty participants from Ministry IenW (Including RWS, RIVM, DGMI) and Ministry BZ participated in this summerschool. Teacher Jaco Appelman summarized it simply. "Do not ask yourself how you can build infrastructure that does not harm the environment, but how you can realize infrastructure that adds something positive to the environment." He and other teachers inspired the thirty or so participants in making their own plan. This time the idea "Let 1000 bridges bloom" was chosen by the jury as the best.

#### TRAIL/TUD-IenW Masterclasses

Since 2013, TRAIL is organising Master classes (about 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 2019, the following 6 Master classes were organized by TRAIL (all in Dutch):

#### Satellietdata voor beter beleid

Satellieten kunnen steeds beter monitoren wat er op, boven en in ons aardoppervlak gebeurt. Voor lenW liggen er veel kansen om beleid te ontwikkelen, te evalueren en bij te stellen met behulp van satelliet data. Welke ervaringen zijn er tot nu en welke kansen liggen er voor lenW?

De sprekers werden ingeleid door Peter Díez, directeur International Affairs van IenW en Harm van de Wetering, directeur Nederlands Space Office.

Door: Pieternel Levelt, (TU Delft/KNMI) en Ramon Hanssen (TU Delft/SkyGeo)

#### Inclusieve innovatie: (hoe) doet iedereen mee?

Hoe kunnen we ervoor zorgen dat technologische innovaties ten goede komen aan iedereen en niemand wordt uitgesloten? Gaan technologische vernieuwing en sociaalmaatschappelijke verschuivingen niet altijd hand in hand? Kennis is macht; technologische innovatie leidt eveneens tot veranderende machtsposities en verantwoordelijkheden. Hoe kunnen we – ook als beleidsmakers – slim anticiperen op dit soort mechanisme en wat kunnen we daarbij leren van de geschiedenis?

Door: Harro van Lente (Maastricht University) en Ruth Oldenziel (Technische Universiteit Eindhoven)

#### Transities economisch bekeken

IenW staat aan de lat om bij te dragen aan verschillende maatschappelijke transities. Hoe kunnen principes en instrumenten uit de economische hoek helpen bij het bevorderen hiervan? Denk hierbij aan prijsprikkels en andere manieren om mensen en systemen in een andere richting te 'duwen'. Andersom denken kan óók: is er niet een heel andere economie nodig voor een daadwerkelijke transitie richting duurzaamheid? Een meer sociale, lokale, immaterieel gerichte? Tijdens de masterclass bekijken we transities vanuit verschillende economische perspectieven.

Door: Herman Vollebergh (Tilburg University) en René Kemp (Maastricht University)

#### Vergroening van de luchtvaart – nu & straks

De luchtvaart moet duurzamer omwille van het klimaat (wereldwijd) en ook het geluid en de luchtkwaliteit (meer lokaal). Een actueel thema dat niet alleen in de op handen zijnde Luchtvaartnota speelt, maar ook internationaal de nodige hoofdbrekens kost – zeker nu de elke investering in vergroening teniet lijkt te worden gedaan door de aanhoudende groei in het vliegen. Welke oplossingen zijn er rond brandstoffen, aanvliegroutes, andere typen vliegtuigen, en geluid? En wat betekent dit voor het beleid van IenW? *Door: Jacco Hoekstra (TUD) en Dick Simons (TUD)* 

#### De fiets als vehikel voor transitie

Onderzoekers van het onderzoeksproject Smart Cycling Futures zullen ons inleiden. Onderwerpen die aan bod zullen komen, zijn onder meer:

•De fiets als 'vehikel' voor transitie: de benadering van Smart Cyling Futures

Fietsinnovaties en stedelijke transformaties en de rol van living labs en experimenten
Businessmodelinnovatie en de relatie met formele en informele instituties (case deelfietssystemen)

•Stedelijk ontwerp vanuit het fietsersperspectief

•De rol van de gebruikers binnen de governance van het fietssysteem / fietsbeleid, casus: fietsstraten

•Datagebruik

•Samenwerking mobiliteit, gezondheid, welzijn

#### Planeet maakt mens - mens maakt planeet

We leven in het Antropoceen, het tijdperk van de mens. De invloed van de mens op het reilen en zeilen van de aarde is groter dan ooit tevoren. Dit dwingt ons om na te denken over urgentie, complexiteit en verantwoordelijkheid. Tegelijkertijd kunnen we natuurlijke processen als bouwstenen gebruiken voor circulair ontwerp. Welk handelingsperspectief biedt het bewustzijn van de onlosmakelijke verbondenheid tussen mens en natuur – ook voor een departement als lenW, dat aan de lat staat voor onder meer de transitie naar een circulaire economie en voor ruimtelijke klimaatadaptatie? Door: Albert Faber (Ministerie EZK) en Jaco Appelman (UU)

### 4.2 Outlook

Important activities in 2020 on Knowledge Transfer will be:

- TRAIL Internal PhD Congress
- Second national conference on Operations Management and Logistics, with research

school Beta and the research institute ERIM

- TRAIL lenW cooperation:
  - Policy Relevance of TRAIL PhD Theses
  - Special Topics sessions
  - In house courses for lenW employees
- TRAIL International Summer school on Automated Driving
- Various TRAIL IenW Masterclasses

## 5 Concluding remarks

As 2018, 2019 was a relatively stable year: we did not implement significant changes in PhD courses or professional activities. A major event was the 25<sup>th</sup> anniversary event organised at the Railway museum in Utrecht.

The links with the PhD Council are very useful. Not only does the council in a proactive way provide nice suggestions, they also give useful feedback on plans and ideas of the TRAIL office, and again they co-organized the TRAIL yearly PhD Congress.

TRAIL is very pleased that the collaboration with the Ministry of Infrastructure and Water Management will be continued, and that collaboration might be intensified including offering additional, in-house courses based on TRAIL-courses developed for PhD students.

## Appendix 1: Overview of TRAIL Theses in 2019

## Information Integration and Intelligent Control of Port Logistics System

### By Fan Feng

ICT-enabled decision-making systems play a key role in port logistics systems. This dissertation aims at improving port logistics performance by developing an integrated decision-making system using advanced ICT technologies. First, the designed framework is assessed by addressing the problem of hinterland barge transport planning. A collaborative decisionmaking system is designed for the coordinative planning by means of a multi-agent system and meta-heuristics. Second, the designed framework is assessed by addressing the problem of reliability assessment of largescale belt conveyor system. A context-aware system is implemented for integrated decision-making by means of a multi-agent system and ontology.

#### Green Bulk Terminals: A strategic level approach to solid biomass terminal design By Ioannis Dafnomilis

Strategic level planning of solid biomass terminals requires much more complex logistics than regular port terminal design. This Ph.D. thesis deals with the optimization of solid biomass terminal design in terms of equipment and infrastructure selection, utilization, and salvage. Two different design approaches are developed, based on expected biomass throughputs – a static design method for more definite biomass flows, and a multi-stage planning method more suitable for high uncertainty circumstances.

#### **Controlled Perishable Goods Logistics: Real-time coordination for fresher products** By Xiao Lin

Food and other fresh products are wasted in large amounts due to their perishing nature. This thesis discusses using real-time information to help supply chains reduce waste in perishable goods logistics. A modeling method is introduced to consider products' quality features and logistics features. With the model predictive control strategy, logistic processes can be improved for perishable goods supply chains. Simulation studies show that the proposed approach can help supply chain players reduce the waste of their products in dynamic environments.

#### **Railway Wheel Defect Identification**

#### By Alireza Alemi

Wheels are critical components of trains, and their conditions should be therefore monitored. Wheel defects change the wheel-rail contact and cause high impact forces that are damaging for tracks and trains. Wheel defects can also cause unexpected failures that reduce the availability and reliability of the railway system. Several monitoring systems have been developed to detect and identify the wheel defects. Wheel Impact Load Detector (WILD) is commonly used to estimate the wheel condition by measuring the wheel-rail contact force. WILDs normally measure the contact force by multiple sensors in different locations to sample from different portions of the wheel circumference. The variation in the forces measured by the multiple sensors presents the condition of the wheel. This method is not useful for monitoring the minor defects. This thesis aims to develop a monitoring system to accurately estimate the wheel condition by detecting and identifying its defects.

#### A Novel Design of the Transport Infrastructure for Traffic Simulation Models

#### By Guus Tamminga

This dissertation covers two questions. How to make a transport and traffic model that enables model users and developers to reuse the existing code, learn from it, improve methods, and/or extend it with innovative functionality? And what is a good design of the modelled transportation infrastructure for road based traffic, in order to fulfil the functional requirements and enable a proper data-exchange with other models and external data sources?

#### **Consumers, Business Models and Electric Vehicles**

#### By Fanchao Liao

Applying alternative business models may help in increasing electric vehicle penetration. However, consumer preferences for alternative business models are unclear and there is a lack of understanding regarding how business models can influence electric vehicle adoption. This thesis addresses these gaps by conducting a literature review on consumer preferences for electric vehicles and multiple empirical quantitative studies investigating the impact of multiple business models on electric vehicle adoption.

#### Sustainability of Deep Sea Mining Transport Plans

#### By Wenbing Ma

The research conducted in this thesis aims at designing an assessment system to evaluate the sustainability of DSM transport plans. To evaluate the sustainability of deep sea mining transport plans, three types of vertical lifting mechanisms are considered: continuous line bucket lifting system, pipe lifting with centrifugal pumps, and pipe lifting with air pumps in terms of the energy consumption, profitability and the caused environmental impacts.

#### Toll Roads in Indonesia: transport system, accessibility, spatial and equity impacts

#### By Ayu Andani

Toll roads can be implemented to influence users' travel behavior and reduce congestion. In Indonesia, a toll is commonly implemented on major highways as a way to fund the construction. Regardless of their objective, toll roads can have a variety of effects. This thesis provides empirical evidence that a toll road can have direct and indirect effects and that these effects are distributed unevenly across geographic regions and individuals.

#### Container Transport inside the Port Area and to the Hinterland

#### By Qu Hu

This thesis discusses the connection between container terminals and the hinterland railway system. Mathematical models are proposed to formulate the various relevant operations and methods are developed to provide solutions to improve the system performance. This thesis could provide suggestions to decision maker(s) regarding to the improvement in both inter-terminal transport system and the hinterland railway system, i.e., increasing the number of containers delivered on time with lower costs.

#### Traffic Management Optimization of Railway Networks

#### By Xiaojie Luan

This thesis adopts optimization approaches to tackle the traffic management problem for railway networks, aiming at achieving better performance of railway operations, in terms of punctuality, reliability, nondiscrimination, capacity utilization, and energy efficiency. Specifically, this is achieved in the following four aspects: non-discriminatory traffic control, traffic control cooperating with a preventive maintenance plan, traffic control integrating with train control, and distributed optimization of traffic control for large networks.

#### Vessel Route Choice Model and Operational Model Based on Optimal Control

By Yaqing Shu

This thesis focuses on analyzing vessel behavior including speed, course and path based on the Automatic Identification System (AIS) data, and developing the route choice (RC) model and the vessel maneuvering prediction (VMP) model based on optimal control theory to simulate vessel behavior in ports and inland waterways. Both the RC model and VMP model are calibrated using AIS data, and then used for a case study.

#### Unravelling Mode and Route Choice Behaviour of Active Mode Users

#### By Danique Tan

Increasing urbanisation rates accompanied by growing transportation demands, sparked global interest in active mode use. This thesis identifies the determinants associated with mode and route choice behavior of active mode users. The formation of choice sets based on experience has been investigated and applied. Finally, approaches for simultaneously modelling multiple travel choices have been evaluated. The findings can be used as input for policy measures to increase active mode use.

#### Planning and Operation of Automated Taxi Systems

#### By Xiao Liang

This thesis studies the planning and operational strategies that automated taxi systems should follow in order to satisfy mobility demand. It explores how automated driving can serve mobility and what is the best way to introduce this technology as part of the existing transport networks. The applications of the proposed models provide an insight into the quantitative benefits for relevant stakeholders when implementing automated taxis in urban mobility.

#### **Spatial Dependence in Travel Demand Models: Causes, implications, and solutions** By Kasper Kerkman

Travel demand models are an essential tool to support transport planners and policy makers when preparing and taking decisions on future transport plans and projects. Spatial dependence in travel flows potentially has a large influence on the accuracy of these models. This PhD thesis demonstrates the existence of spatial dependence in public transport travel flows, and shows how this influences the accuracy of predictions produced by conventional travel demand models, as well as the improvements that can be obtained in travel forecasts if spatially-explicit models would be used.

#### **Cooperative Multi-Vessel Systems for Waterborne Transport**

#### By Linying Chen

This PhD thesis investigates V2V, V2I, and I2I cooperation of CMVSs for improving the safety and efficiency of waterborne transport. A predictive motion control framework and a generic negotiation framework are proposed to achieve consensus among controllers. Different applications provide insights into the impact of CMVSs on the performance of waterborne transport systems. Specifically, four types of cooperation and their applications to the Port of Rotterdam and the metropolitan area of Amsterdam are investigated, i.e., Vessel Train Formation (VTF), Cooperative Floating Object Transport (CFOT), Waterway Intersection Scheduling (WIS), and Cooperative Waterway Intersection Scheduling (CWIS).

#### Passenger-Oriented Timetable Rescheduling in Railway Disruption Management By Yongqui Zhu

Railway systems are vulnerable to unexpected disruptions, which usually result in track blockages for a few hours. In practice, disruptions are handled manually and the resulting impact to passengers is rarely considered. To enable disruption management more efficiently, operator-friendly and passenger-friendly, this thesis develops mathematical models and solution methods for dynamic passenger assignment, timetable rescheduling, and the integrated passenger assignment with timetable rescheduling during disruptions.

## Appendix 2: TRAIL Staff Members on 31-12-2019

Titels			Name	University
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.	В.	van	Arem	Technische Universiteit Delft-Fac. Civiele Techniek en Geowetenschappen
Dr.	В.		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
Prof. dr.	K.A.		Brookhuis	Rijksuniversiteit Groningen - Faculteit der Gedrags- en Maatschappijwetenschappen
Dr. ir.	Ρ.		Buijs	Rijksuniversiteit Groningen-Fac. Economie en Bedrijfskunde
Dr.	0.		Cats	Technische Universiteit Delft-Fac. Civiele Techniek en Geowetenschappen
Prof. dr. ir.	C.G.		Chorus	Technische Universiteit Delft-Fac. Techniek, Bestuur en Management
Dr. ir.	F.		Corman	TU Delft- Fac. Werktuigbouwkunde, Maritieme Techniek & Technische Materiaalwetenschappen
Dr. ir.	G.		Correia	Technische Universiteit Delft-Fac. Civiele Techniek en Geowetenschappen
Prof.	R.		Curran	Technische Universiteit Delft - Faculteit der Luchtvaart- en Ruimtevaarttechniek
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.	В.		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
Dr.	M.S.	van	Geenhuizen	Technische Universiteit Delft-Fac. Techniek, Bestuur en Management
Prof. dr.	Н.		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
Dr. ir.	Α.		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
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Dr.	М.		Janic	Technische Universiteit Delft-Fac. Civiele Techniek en Geowetenschappen
Dr.	Х.		Jiang	TU Delft- Fac. Werktuigbouwkunde, Maritieme Techniek & Technische Materiaalwetenschappen
MEng, Dr. techn	Ρ.		Jittrapirom	Radboud Universiteit Nijmegen - Faculteit der Managementwetenschappen
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Prof. dr. ir.	J.W.C.	van	Lint	Technische Universiteit Delft-Fac. Civiele Techniek en Geowetenschappen
Dr. rer. soc.	H.K.		Lukosch	Technische Universiteit Delft-Fac. Techniek, Bestuur en Management
Dr.	C.		Maat	Technische Universiteit Delft-Fac. Civiele Techniek en Geowetenschappen
Prof. dr. ir.	V.A.W.J.		Marchau	TRAIL Research School
Dr.	K.		Martens	Radboud Universiteit Nijmegen - Faculteit der Managementwetenschappen
Prof. dr.	M.H.		Martens	Technische Universiteit Eindhoven
Prof. dr.	H.J.		Meurs	MuConsult B.V.
Prof.dr.	H.J.		Meurs	Radboud Universiteit Nijmegen - Faculteit der Managementwetenschappen
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Dr.	S.		Rasouli	Technische Universiteit Eindhoven
Dr.	J.		Rezaei	Technische Universiteit Delft-Fac. Techniek, Bestuur en Management
Dr.	J.		Riezebos	Rijksuniversiteit Groningen-Fac. Economie en Bedrijfskunde
Prof. dr.	K.J.		Roodbergen	Rijksuniversiteit Groningen-Fac. Economie en Bedrijfskunde
Dr. rer. Nat.	M.E.		Schmidt	Erasmus Universiteit Rotterdam -RSM
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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.	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.	Α.		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
Dr.	M.M.	de	Weerdt	Technische Universiteit Delft - Faculteit Electrotechniek, Wiskunde & Informatica
Prof. ir.	F.C.M.		Wegman	Technische Universiteit Delft-Fac. Civiele Techniek en Geowetenschappen
Dr.	В.		Wiegmans	Technische Universiteit Delft-Fac. Civiele Techniek en Geowetenschappen
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Prof. dr. ir.	J.C.		Wortmann	Rijksuniversiteit Groningen - Faculteit Bedrijfskunde
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 31-12-2019

Title Research	Name	PhD	Univ.	Fac.
A. Transport & Mobility				
The Relationship between Road Safety, Infrastructure and Driving Behaviour on 80 km/h Roads	Kirsten	Duivenvoorden	TUD	CiTG
Uncertainty and Cost-Effectiveness of Policy Measures to Reduce CO2 Emissions from Transport	Robert	Kok	TUD	ТВМ
Activity-Based Travel Demand Modeling under Uncertainty	Eleni	Charoniti	TUE	BE
The Impact of Time on the Relationship between Travel Behaviour and the Built Environment	Paul	Coevering, van de	TUD	BK
A New Approach to Transport Modelling by Using Ubiquitos Data: the activity-space model	Yihong	Wang	TUD	CiTG
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
Synthesis of Machine Learning and Choice Modeling	Ahmad	Alwosheel	TUD	TBM
Cycling, Gender and Transport Poverty	Angela	Kloof, van der	RUN	NSM
Travel and Location Choice Behaviour of Prospective Automated Vehicle Users	Baiba	Pudane	TUD	TBM
Infrastructure Service Network Design for Automated Vehicles	Bahman	Madadi	TUD	CiTG
The Next Frontier in Random Regret Minimization Modeling	Bing	Huang	TUD	TBM
Activity Based Model of Travel Demand	Valeria	Caiati	TUE	BE
Automated Driving in Freight Transport Truck Platooning	Anirudh	Kishore Bhoopalam	EUR	RSM
Interface Design for Transitions between Manual and Automated Driving	Anika	Boelhouwer	UT	CTW
Smart Incentives for Sustainable Travel Behaviour	Nadja	Zeiske	RUG	GMW
Moral Discrete Choice Theory	Teodora	Szep	TUD	TBM
New Discrete Choice Theory for Understanding Moral Decision Making Behavior	Tom	Berg, van den	TUD	TBM
Integrating Realistic Demand Models in Public Transport Optimization	Johann	Hartleb	EUR	RSM
The Influence of Built Environment on Pedestrian and Cyclist Behavior around Metro/Railway Station	Yanan	Liu	TUE	BE

Exploring Ways to Incorporate Ethics in Artificial Moral Beings	Andreia	Martins Martinho Bessa	TUD	ТВМ
Evaluating Electric Vehicle Charging Infrastructure Policies	Rick	Wolbertus	TUD	TBM
Transportation for Self-Organization trough Network Integration and Collaboration	Anique	Kuijpers	TUD	TBM
Agent-based Modelling of Moral Equilibria	Tanzhe	Tang	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
Real-time Synchro-modal Planning	Jeroen	Vester	EUR	ESE
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
Effectiveness and Acceptability of a Peak Pricing Scheme on Passenger Rail	Andrike	Mastebroek	TUD	TBM
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
An Integrated Analytical Moel for Predicting the Collapse Pressure of Flexible Risers in Ultra-Deep Water	Xiao	Li	TUD	3ME
Road Safety for Cyclists in Dutch Cities	Teun	Uijtdewilligen	UT	CTW
Participatory Value Evaluation for Renawable Energy Projects	José	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
Surface Crack Growth in Rigid Pipe Reinforced with FRP	Zongchen	Li	TUD	3ME
Automated Shuttles as Part of a Public Transport Network	Irene	Zubin	TUD	CiTG

Title Research	Name	PhD	Univ.	Fac.
B. Infrastructure & Traffic Management				
Design of Network Wide Traffic Management System	Ramon	Landman	TUD	CiTG
Dynamic Assessment of Multi-modal Transport Systems	Gijs	Eck, van	TUD	CiTG
Travel Behaviour and Traffic Operations in Case of Exceptional Events	Mahtab	Joueiai	TUD	CiTG
Setting Criteria for Safe Driving Behaviour on the Road	Roald	Loon, van	UT	CTW
STAQ: Static Traffic Assignment with Queuing	Luuk	Brederode	TUD	CiTG
Designing and Managing the Transfer Function of Train Stations	Jeroen	Heuvel, van den	TUD	CiTG
Crowd Behaviour under Exceptional Conditions	Erica	Kinkel	TUD	CiTG
Nautical Traffic Modelling for Safe and Efficient Ports	Yang	Zhou	TUD	CiTG
The Design of High-Speed Railway Passenger Service Plans from a Multimodal Transport Perspective	Fei	Yan	TUD	CiTG
Energy-Efficient Timetable Design	Gerben	Scheepmaker	TUD	CiTG
Airline/ATM Network Performance and Optimization	Yalin	Li	TUD	L&R
Impacts of Automated Driving on Traffic Flow	Freddy	Mullakkal Babu	TUD	CiTG
Dynamics in Mode Choice Behavior	Marie-José	Olde Kalter	UT	CTW
Potential of Increasing Road Vehicle Automation for Traffic Management Application	Paul	Erp, van	TUD	CiTG
Urban Parking Management in the Times of Shared (Automated) Mobility	Konstanze	Winter	TUD	CiTG
Automatic Multiscale Graph Generation from Geographical Data	Panchamy	Krishnakumari	TUD	CiTG
Theory and Modelling of Acquiring, Processing and Storing Spatial Knowledge	Lara-Britt	Zomer	TUD	CiTG
Line Plan Evaluation and Timetabling	Gert-Jaap	Polinder	EUR	RSM
Using Cooperative ACC to form High-performance Vehicle Streams	Lin	Xiao	TUD	CiTG
Connected Driver Assistance and Traffic Management	Niharika	Mahajan	TUD	CiTG
EMPOWER People to Reduce Car Traffic	Bingyuan	Huang	UT	CTW
The Human Factors (User Acceptance/Safety) Side of a Change Assistant System	Paul	Gent, van	TUD	CiTG
Driver Behavior in the Transition of Control between Manual and Automated Driving	Во	Zhang	UT	CTW
Short-term Traffic Prediction	Ding	Luo	TUD	CiTG
Interactions of Automated Driving and Vulnerable Road Users, and Implications of Automated Driving on Traffic Safety and Urban Design	Juan Pablo	Núñez Velasco	TUD	CiTG
Stakeholder Acceptability of Smart Pricing Measures	Lizet	Krabbenborg	TUD	твм

Measuring, Modelling and Improving Reliability and Robustness of Urban Public Transport in a Multi-Level Context: a passenger perspective	Menno	Үар	TUD	CiTG
Demand Responsive Transport Systems in SCRIPTS project	Jishnu Narayan	Sreekantan Nair	TUD	CiTG
Using a Network Approach on Modelling Traffic Flow: applying the model to cases in Amsterdam and Rotterdam	Boudewijn	Zwaal	TUD	CiTG
Establishing which Factors Determine the Route and Activity Choices for Active Mode Travelers in an Urban Environment based on Empirical Data	Florian	Schneider	TUD	CiTG
Mobility Forecasting and Evaluation of Responsive Intelligent Public Transport Systems	Maria	Alonso Gonzalez	TUD	CiTG
Scenario-based Multi-objective Automated Driving Strategies for Safe and Efficient Traffic	Na	Chen	TUD	CiTG
Theory and Microscopic Modelling of Active Traffic Behaviour	Alexandra	Gavriilidou	TUD	CiTG
Usage of Recorded Actual Travel Data for Long-term Demand Prediction	Jord	Vliet, van der	TUD	CiTG
Active Mode Research Based on Social Media Data	Xun	Gong	TUD	CiTG
Human Factors in Self-Driving Cars	Francesco	Walker	UT	CTW
Macroscopic Modelling of Active Mode Traffic	Marie-Jette	Wierbos	TUD	CiTG
Cross Project Learning by an International Project Base of Large Infrastructure Projects	Yan	Liu	TUD	CiTG
Lane-specific Traffic Flow Control Models	Hari Hara Sharan	Nagalur Subraveti	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
Hybrid Model for freeway Traffic State Estimation and Prediction using Traffic Flow Theory and Historical Data	Tin	Nguyen	TUD	CiTG
The Use of VR/AR to Determine Pedestrian Walking and Travel Choice Behaviour	Yan	Feng	TUD	CiTG
Modelling Traffic Operations and Capacity Considering Driving Behaviours and Cooperative Driving at Signalized intersections	Meiqi	Liu	TUD	CiTG
Managing Cyclist Flows in Urban Areas	Giulia	Reggiani	TUD	CiTG
Understanding Traveller Behaviour under Choices in the Context of Public Transportation using a Combination of Data Sources	Sanmay	Shelat	TUD	CiTG
How Should Automated Vehicles Communicate with Other Road Users	Ana	Rodríguez Palmeiro	TUD	CiTG
Impact of North-South Metro Line in Amsterdam on public Transport Ridership & Quality	Malvika	Dixit	TUD	CiTG

Advanced Traffic Management Strategies to Improve the Reliability of Port-to-Hinterland Freight Operations	Salil	Sharma	TUD	CiTG
Data-driven Integrated Model for Joint Traffic and Logistics Management	Ali	Nadi Najafabadi	TUD	CiTG
Real-time Forecasting of Large-scale Crowd Movements	Martijn	Sparnaaij	TUD	CiTG
Exploration of Ethical Indicators Related to Safety Effects of Policy Options to include in the Ex-ante Evaluations	Merhnaz	Asadi	TUD	ТВМ
Improvement of the Utrecht Public Transport system by the Integration of Modes	Roy	Kuijk, van	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	
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	ТВМ
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	Ruijter, de	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

Title Research	Name	PhD	Univ.	Fac,
C. Logistics and Transport Organisation				
Multi-Level Control of Large-Scale Logistic Systems	Yashar	Zeinaly	TUD	3ME
Dynamic Contracting in Infrastructures	Joris	Scharpff	TUD	EWI
Modelling and Optimization on Local Traffic Networks	Yu	Hu	TUD	3ME
Revenue Management and complexity in Public Transport	Paul	Bouman	EUR	RSM
Assessing the Gain of Sharing Demand Forecast in FMCG Supply Chains	Clint	Pennings	EUR	RSM
Design and Control of Autonomous Vehicle Storage and Retrieval Systems	Masoud	Mirzaei	EUR	RSM
Simultaneous Management of Transfers on Railway Networks for Passengers and Freight Flows	Wenhua	Qu	TUD	3ME
Multi-channel Inventory Control	Arjan	Dijkstra	RUG	FEB
Sustainable Logistics in Fresh Food (SLIFF)	Roel	Post	RUG	FEB
Performance Interaction Model	Alf	Smolders	TUD	CiTG
Analysis of Autonomous Vehicle Storage and Retrieval Systems (AVSRS)	Kaveh	Azadeh	EUR	RSM
Sustainable Logistics in Fresh Food	Arpan	Rijal	EUR	RSM
Decision Making on Distribution Structures and Distribution Centre Locations	Sander	Onstein	TUD	TBM
Incentives for Renewable Energy	Jose	Lopez	RUG	FEB
Integrated Synchromodal Transport System Analysis	Masoud	Khakdaman	TUD	TBM
Effective Use of Reefer Containers through the Port of Rotterdam: a transitions oriented approach	Bob	Castelein	EUR	FSW
Consolidation of Transportation Flows in Multi-Channel Retail	Joydeep	Paul	EUR	RSM
The Development of Multi-Level Capacity Control Mechanisms in Synchromodal Transport	Hobbs	White	EUR	RSM
Developing Efficient Methods for the Robust Management of Fleets of Cooperative (Automated) Vehicles	Johan	Los	TUD	3ME
Synchromodal Transport	Alberto	Giudici	EUR	RSM
Dynamic Fleet Management of Automated Vehicles	Breno	Alves Beirigo	TUD	3ME
Physical Internet	Patrick	Fahim	TUD	TBM
Synchromodal Transportation in Multinational Cold Chains	Wenjing	Guo	TUD	3ME
Composite Indicators of Company Performance for Truck Manufacturers	Qinqin	Zeng	TUD	3ME
Supply Chain Disruption Management	Bahareh	Zohoori	TUD	TBM
Collaboration Mechanisms Design for Green Supply Chain	Kailan	Wu	TUD	TBM
Predictive Synchromodality for more Efficient Container Transportation	Rie	Larsen	TUD	3ME

Sustainable City Logistics and Urban Consolodation Centres	Anna	Dreischerf	RUG	E&B
Cooperative Control for Autonomous Ship	Zhe	Du	TUD	3ME
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	ТВМ
Multi-Objective Optimization for Maratime and Hinterland Transportation	Yimeng	Zhang	TUD	3ME

#### \* Themes

1. Transport & Mobility

2. Infrastructure & Traffic

3. Logistics

#### \*\* Abbreviations

Delft University of Technology Erasmus University Rotterdam Radboud University Nijmegen University of Twente TUD

EUR

RU

UT

TUEEindhoven University of TechnologyRUGUniversity of Groningen