



# **Year Report 2017 TRAIL Research School**

**TRAIL Research School, March 2018**

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## **Selected Highlights TRAIL Research School 2017**

- 14 PhD-students received their PhD-degree
- 20 new PhD-students started at TRAIL
- 3 new Staff members joined TRAIL
- TRAIL organized 12 PhD courses and 9 master classes
- TRAIL organized (together with research school NETHUR) the 2<sup>nd</sup> week course for starting researchers within the Sustainable Urban Regions of the Future program (NWO);
- TRAIL organized a very successful TRAIL PhD congress in Utrecht in November
- TRAIL organized 7 Masterclasses and a Summer school for IenW employees
- Staff member Prof. Iris Vis is appointed Dean of faculty Industry Relations of the RUG
- Staff member Prof. Rob Goverde appointed as full professor on Railway Traffic Operations & Management.
- Staff member Prof. Bart van Arem wins the IEEE ITS Society Institutional lead Award for his role in shaping the TU Delft Automated Driving Research program.
- Staff member Prof. Rudy Negenborn appointed as full professor of Multi-machine Operations & Logistics.



# 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 31-12-2017 TRAIL counted 64 Staff members, 3 associated staff members, and 127 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 chairperson;
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;
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 2017 and further is presented.

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<sup>1</sup> See [www.rstrail.nl](http://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 2017 TRAIL performed the following activities:

- The organization of 12 PhD courses and 9 master classes
- The organization of the 3<sup>rd</sup> 1.5-year cycle of the graduate program with Research School Beta on Operations Management and Logistics (GP-OML)
- The implementation of the 2<sup>nd</sup> part of the graduate program with MSc TIL (granted by NWO)

### 2.1 TRAIL courses and master classes in 2017

The new TRAIL T&E program (as, implemented in 2014) was slightly updated in 2017. These updates involved fine-tuning credits in line with the rules of local Graduate Schools and further clarification of the rules for following and passing courses at TRAIL. Table 1 gives an overview of the TRAIL 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](#).

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<sup>2</sup> For non-TRAIL PhD students a fee applies, unless there is an agreement between TRAIL and the PhD student's institute. See section 3.3 for details.



Table 1: TRAIL T&E course program

<b>I TRAIL Basic Courses</b> <sup>1</sup>	<b>By</b>	<b>Part</b> <sup>2</sup>	<b>ECTS</b> <sup>3</sup>
TRAIL Fundamental Domain Knowledge (4d) <sup>4</sup>	OML	D	1 - 4
TRAIL Theories and Methods (3d)	TRAIL	T, M	1 - 3
Introduction to TRAIL and the PhD student process (0.5d)	TRAIL	S	0.25
Societal Relevance of your PhD Research (1d)	TRAIL	S	0.25 – 1
Profile of Future Employers of PhD Students (0.5d)	TRAIL	S	0.25

<b>II General TRAIL Courses</b> <sup>1</sup>	<b>By</b>	<b>Part</b> <sup>2</sup>	<b>ECTS</b> <sup>3</sup>
TRAIL Data-analysis and Statistics (3d) <sup>4</sup>	OML	S	1 - 3
Transport Innovations (1d)	TRAIL	D	1 - 2
TRAIL Writing a Literature Review in the TIL Domain (2d)	TRAIL	S	1 - 4
Writing and Publishing a TRAIL Research Article (1d)	TRAIL	S	0.5 - 1

<b>III TRAIL Specialization Courses</b> <sup>1</sup>	<b>By</b>	<b>Part</b> <sup>5</sup>	<b>ECTS</b> <sup>3</sup>
Discrete Choice Modelling (4d)	TRAIL	T	1 - 4
Traffic Flow Phenomena (3d)	TRAIL	I	1 - 3
Behavioural Aspects in Transport (1d)	TRAIL	I	0.5 – 1
Transport Logistics Modelling (4d) <sup>4</sup>	OML	L	1 - 4
Facility Logistics Management (4d) <sup>4</sup>	OML	L	1 - 4
Operations Research and Health Care (4d) <sup>4</sup>	OML	L	1 - 4
Quantitative Modelling and Analysis of Supply Chains (4d) <sup>4</sup>	OML	L	1 - 4
Advanced Inventory Theory (4d) <sup>4</sup>	OML	L	1 - 4
Freight Transport Management (4d) <sup>4</sup>	OML	L	1 - 4
Public Transport – Class (4d) <sup>4</sup>	OML	L	1 - 4

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

<sup>5</sup> T: Transport, I: Infrastructure, L: Logistics

Table 2: TRAIL courses given in 2017

Title	Start date	No. days	Course leader(s)	ECTS
Design of Stated choice/Preference & Discrete Choice Modelling	11 Apr.	4	Chorus/Timmermans	1 - 3
Macroscopic Traffic Modelling	8 May (start)	3	Knoop	1 - 2
Writing a Literature Review in the TIL Domain	16 Feb. (start)	2	Van Wee	1 - 4
TRAIL Theories and Methods	21 Sept. (start)	4	Various	1 - 4
From Horse to Porsche: innovations in transport and logistics	27 October	1	Geerlings, Annema, Wiegman	1 - 2
Behavioural Aspects in Transport: introduction to traffic psychology	2 Nov.	1	Brookhuis, De Waard	0.5 - 1

Table 3: TRAIL/Beta GP-OML courses given in 2017

Title	Start date	No. days	Course leader(s)	ECTS
TRAIL Fundamental Domain Knowledge	18 Jan.	4	Van Wee, Annema	1 - 4
Facility Logistics Management	29 Mar.	4	De Koster, Adan	1 - 4
Data-analysis and Statistics	19 Apr.	3	Kroesen, Molin	1 - 3
Capita selecta: Maintenance Planning and Optimization	17 May	2	Teunter, De Jonge	0.5 - 2
Freight Transport Management	6 Sept.	4	Vis, Coelho	1 - 4

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 associated with PhD defenses in 2017

Title	Date	No. days	Lecturers
Transport Models & Innovative Pricing Measures	16 May	0.5	Chorus, Verhoef, Tampère, Axhausen
Challenges in Railway Operations Planning	4 July	0.5	Schöbel, Nie
Advances in Coordinated Traffic Control	26 Oct.	0.5	Menendez, Le Vu, Smits, Wang
Optimal Control Applications in Railway and Road Traffic	6 Dec.	0.5	Liu, Ma
Advances in Road Traffic Modelling and Control	7 Dec.	0.5	Ramezani, Ahn, Leclercq, Rinaldi

Table 5: TRAIL seminars associated with visiting researchers

Title	Date	No. days	Lecturers
What Makes a Transport System Fair	12 Apr.	0.5	Van Wee, Martens, Chorus, Arts
The Role of Cities in Transitions towards Low-Carbon Mobility	23 May	0.5	Schwanen, Bertolini
The Future of Infrastructure Planning	4 Sept.	0.5	Givoni, Meurs
Bike Share	6 Sept.	0.5	Fishman, Maat

## 2.2 The Graduate Program – Operations Management and Logistics

The 1.5 year 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.

Mid 2015, the GP-OML program was evaluated positively and it was decided to start a second round which ranged till the end of 2016. A third cycle has started in January 2017.

## 2.3 Evaluation results

A recent evaluation of the TRAIL T&E program over the period 2013-2016 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).
- Most courses have about 10 or more participants (informal threshold for courses of 1 ects or more).
- 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), with an average of 8.4 (out of a scale from 0 to 10) for all 2016 courses.

year	average grade all courses
2013	7,8
2014	7.6
2015	8.2
2016	8.4
2017	7.9

## 2.4 The TRAIL Graduate School program

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.

In 2014 and 2015, five PhD students started their PhD:

- ➔ Mariska van Essen (UTwente-TU Delft)
- ➔ Fanchao Liao (TU Delft – UTwente)
- ➔ Konstanze Winter (TU Delft – RU)
- ➔ Paul van Erp (TU Delft – UT)
- ➔ Yihong Wang (TU Delft – TUE)

In 2018 the progress of these PhD students will be evaluated in line with the NWO-GP mid-term requirements.

## 2.5 Origins of PhD students

The Table below indicates the origin of starting TRAIL PhD students within the period of 2010-2017. The figures show that:

- After strong increases in TRAIL PhD students in 2015 and 2016, in 2017 marked an average year of inflow. This is related to varying research funding opportunities over different years (e.g. NWO);
- Most students originate from China (except for 2015 and 2016 (The Netherlands));
- In 2017, the share of PhD students from other countries than the Netherlands increased substantially.

Some possible explanations for these developments are:

- Since 2014, TRAIL-PhD students do not have pay a yearly fee of €750,00
- TRAIL staff members have been very successful in acquiring funding within larger research programs (e.g. NWO-SURF, ERC, Chinese Scholarship program)

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

## 2.6 TRAIL Training and Education outlook

The education activities mentioned in section 2.1-2.3 will be continued in 2018 and further. In addition, TRAIL will organize, together with Research School NETHUR, comeback-days for researchers (PhD students, junior researchers, etc.) working within the NWO program Sustainable Urban Regions for the Future (SURF) program. These days will focus on research progress, co-creation within SURF-consortia and knowledge dissemination of SURF-findings. Trail further organizes an International Summer school on Automated Driving.

### 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 (leaders: Chorus, Meurs, Timmermans)
  - a. Demand – Supply Interaction
  - b. Policy, Planning, and Management
- B. Infrastructure and Traffic Management (leaders: Hoogendoorn, Van Berkum<sup>3</sup>)
  - a. Drivers' Behavior
  - b. (Dynamic) Traffic Management
  - c. Intelligent Transport Systems
- C. Logistics and Transport Organization (leaders: De Koster, Tavasszy, Lodewijks, Vis)
  - a. Logistics and Supply Chain Management
  - b. Transport (Service) Networks
  - c. Network Design.

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<sup>3</sup> Prof. dr. Karel Brookhuis was a member until his retirement. 9-3-2017) Prof. dr. Dick de Waard (RUG) accepted the invitation to take over this position.

### 3.4 PhD Research

#### **Dissertations**

In 2017, 14 TRAIL PhD students received a PhD degree (see Table 5). In Appendix 1 the summaries of these theses are given.

*Table 5: TRAIL PhD theses 2017*

Title	Name	University <sup>1</sup>	Month of Defense
<b>The Design, Planning and Execution of Sustainable Intermodal Port-hinterland Transport Networks</b>	Panagiotis Ypsilantis	RSM	January
<b>Strategic Modeling of Global Container Transport Networks: Exploring the future of port-hinterland and maritime container transport networks</b>	Ronald Halim	DUT	March
<b>Bottom-Up Information Provision in Urban Parking: An in-depth analysis of impacts on parking dynamics</b>	Geert Tasseron	NSM	March
<b>Strategic Network Modelling for Passenger Transport Pricing</b>	Erik-Sander Smits	DUT	May
<b>Transport Networks, Land Use and Travel Behaviour: A long term investigation</b>	Dena Kasraian Moghaddam	DUT	May
<b>Consumer Heterogeneity, Transport and the Environment</b>	Yashar Araghi	DUT	May
<b>Efficient Predictive Model-Based and Fuzzy Control for Green Urban Mobility</b>	Anahita Jamshidnejad	DUT	June
<b>Situation Awareness for Socio Technical Systems: A simulation gaming study in intermodal transport operations</b>	Shalini Kurapati	DUT	June
<b>Surface Wear Reduction of Bulk Solids Handling Equipment Using Bionic Design</b>	Guangming Chen	DUT	June
<b>Integrated Capacity Assessment and Timetabling Models for Dense Railway Networks</b>	Nicola Bešinović	DUT	July
<b>Energy Saving for Belt Conveyors by Speed Control</b>	D. He		July
<b>Efficient Algorithms for Network-wide Road Traffic Control</b>	Goof van de Weg	DUT	October
<b>Train Trajectory Optimization Methods for Energy-Efficient Railway Operations</b>	Pengling Wang	DUT	December
<b>Fast Model Predictive Control Approaches for Road Traffic Control</b>	Yu Han	DUT	December

<sup>1</sup> DUT – Delft University of Technology  
RSM – Rotterdam School of Management  
NSM – Nijmegen School of Management

In 2017, 20 PhD students started at TRAIL. Table 6 gives an overview of these new projects.

Table 6: Newly started PhD students at TRAIL in 2017

Name	Project	Univ.	Fac.	Sponsor
<b>Albert Giudici</b>	Synchromodal transport	EUR	TOM	
<b>Alphonse Vial</b>	Sensing platform: monitoring, modelling and forecasting urban mobility through interactions of connected autonomous vehicles and active modes.	DUT	CEG	ERC
<b>Bahareh Zoohoori</b>	Supply chain disruption management	DUT	TPM	
<b>Breno Alves Beirigo</b>	Developing efficient methods for the robust management of fleets of cooperative (automated) vehicles	DUT	3ME	
<b>Hari Nagular Subraveti</b>	Lane-specific traffic flow control models	DUT	CEG	STW
<b>Johann Hartleb</b>	Integrating realistic demand models in public transport optimization	EUR	RSM	
<b>Kailan Wu</b>	Collaboration mechanisms design for green supply chain	DUT	TPM	CSC
<b>Maryna Ozturker</b>	Creative re-designing of urban public space in the era of automated driving, vehicle sharing and electrification.	DUT	CEG	
<b>Meiqi Liu</b>	Modelling traffic operations and capacity considering driving behaviours and cooperative driving at signalized intersections.	DUT	CEG	CSC
<b>Oskar Eikenbroek</b>	Online route planning in response to non-recurrent traffic disruptions	UT	CTW	NWO
<b>Patrick Fahim</b>	Physical Internet	DUT	TPM	NWO
<b>Qinqin Zeng</b>	Composite indicators of company performance for truck manufactures	DUT	3ME	
<b>Seyed Shaho Amadi</b>	Modelling of road traffic noise, with an application in Kermanshah, Iran	DUT	CEG	
<b>Teodora Szep</b>	Moral discrete choice theory	DUT	TPM	ERC
<b>Thien Tin Nguyen</b>	Hybrid model for freeway traffic state estimation and prediction using traffic flow theory and historical data	DUT	CEG	NWO/RWS
<b>Tom van den Berg</b>	New discrete choice theory for understanding moral decision making behaviour	DUT	TPM	ERC

<b>Wenjing Guo</b>	Synchromodal transportation in multinational cold chains	DUT	3ME	
<b>Yan Feng</b>	The use of VR/AR to determine pedestrian walking and travel choice behaviour.	DUT	CEG	CSC
<b>Yan Liu</b>	Cross Project Learning by an International Project Base of Large Infrastructure Projects	DUT	CEG	CSC
<b>Yanan Liu</b>	The influence of built environment on pedestrian and cyclist behaviour around metro/railway station	EUT	BE	CSC

*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*



### 3.5 Research highlights TRAIL staff members 2017

Research highlights are based on the information TRAIL receives from its members. These highlights are published on our website and in our monthly news bulletin.

Staff member **Prof. Iris Vis** is appointed Dean of faculty Industry Relations of the RUG.

Staff member **Prof. Rob Goverde** appointed as full professor on Railway Traffic Operations & Management. His research has a distinct profile that combines a strong mathematical foundation and empirical research to integrated planning and management of railway operations. The core of the scientific research will address improved methods for timetabling, train operations and real-time railway traffic management to optimize railway transportation. The research particularly takes into account opportunities offered by new technologies such as ERTMS and Automatic Train Operation.

Staff member **Prof. Bart van Arem** wins the IEEE ITS Society Institutional lead Award for his role in shaping the TU Delft Automated Driving Research program.

Staff member **Prof. Rudy Negenborn** appointed as full professor of Multi-machine Operations & Logistics. The focus of Negenborn's research will be on innovative real-time strategies for coordinating the diverse range of components involved in large-scale, networked transport systems.

### 3.6 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

### 4.4 Ktrans highlights 2017

#### *TRAIL PhD Congress 2017*

On November 9 a very successful TRAIL Congress took place in Grand Hotel Karel V in Utrecht: about 30 presentations were given, 70 PhD students and 10 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: 45%) – 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 8.0). Also the venue (location, food, rooms) was appreciated by grading an 8.9. [A photo impression can be found online at the TRAIL website.](#)



#### *Tracks in Transport congress 2017*

On February 2, TRAIL helped the Transport Institute of Delft University of Technology in organising a well visited meeting. About 100 attendees listened to three keynote speakers: Prof. Bert van Wee raised the question of how travel behaviour and human health influence one another. Odette van Riet (Ministry of Infrastructure and the Environment) offered a glimpse into her traveler behaviour research, how this behaviour can be influenced and how the ministry is working towards sustainable mobility. In his keynote speech, Ricky Curran (AE) outlined research being conducted into the optimal airport design, taking capacity, security, expense and the environment into account. Alongside these lectures, the conference also had plenty of visual offerings. A design vision of various ring roads was presented, aimed at improving the connection between motorways and the city while taking account of the introduction of electric and autonomous cars. Visitors were also introduced to a system that can assist in optimising train scheduling and saw how data are used for traffic simulations. A simulation of an airport was also present, offering insights into security and user-friendliness.



### *TRAIL/lenW 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:

On 5/4/2017 by Bert van Wee:

- Woontevredenheid bij snelwegen en de invloed van informatie en participatie
- Complexiteit (doorbreken van) mobiliteitsgedrag
- Onzekerheden in de 'hardheid' van resultaten uit (op activiteiten gebaseerde) verkeersmodellen
- Coördinatie in het achterlandvervoer van havens

On 4/12/2017 by Serge Hoogendoorn:

- De invloed van technologie voor bereikbaarheid, betrouwbaarheid, veerkracht, veiligheid en duurzaamheid
- Het gebruik van verschillende databronnen
- Benutting van (infrastructurele) ruimte
- Regionaal verkeers- en mobiliteitsmanagement
- Design en ITS voor lopen en fietsen
- Veerkracht van netwerken
- Impact van MaaS en 'responsive transit'

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

3/5/2017: Fietsonderzoek en fietsbeleid

30/11/2017: Mobility as a Service

### *TRAIL/TUD DIMI lenW Summer school*

From 4-9 September, 25 lenW policymakers attended the 5<sup>th</sup> Summer school "the airport as a hub for sustainable innovation and transition". This Summer school is a result of the cooperation between Ministry lenW and TU Delft and has been rated a 7.5 this year. The kick-off was at Rotterdam The Hague Airport by Geert Draijer of the Ministry, including a very interesting tour at the Airport. The following days, teachers of several universities and companies gave interesting lectures, located at the KIVI in The Hague.



#### *TRAIL/TUD-IenW Masterclasses*

Since 2013, TRAIL is organising Master classes (about 2 per quarter) for the Ministry of Infrastructure and the Environment. 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 2017 the following 7 Master classes were organized by TRAIL (all in Dutch):

- [Consumentengedrag verduurzamen: wat werkt wel en niet?](#)  
Door: Linda Steg (RUG), Jan Schoormans (TU Delft) en Frank Dietz (PBL)  
Datum: 12 december 2017
- [Omgaan met onzekerheid: slim omgaan met verschillende toekomsten](#)  
Door: Vincent Marchau (Radboud Universiteit) en drs. Pieter Bloemen (staf Deltacommissaris)  
Datum: 11 oktober 2017
- [Duurzame\(re\) luchtvaart in een circulaire economie?](#)  
Door: Paul Peeters (NHTV Breda) en David Peck (TUD)  
Datum: 5 september 2017
- [Klimaatbeleid onder een nieuw gesternte](#)  
Door: prof. dr. Klaas van Egmond (Em. Hoogleraar aan de Universiteit Utrecht)  
Datum: 10 mei 2017
- Rechtvaardige mobiliteit  
Door: prof. dr. Bert van Wee (TUD) en Prof. dr. Karel Martens (RU / Technion)  
Datum: 10 april 2017
- [Bereikbaarheid van stedelijke regio's – naar een andere visie en andere aanpak?](#)  
Door: Prof. dr. Karst Geurs (UT) en Prof. dr. Pieter Hooimeijer (UU)  
Datum: 15 maart 2017
- [Senioren in beweging – gevolgen van vergrijzing en verzilvering voor de mobiliteit](#)  
Door: Dr. Frank van Dam (PBL) en Prof. dr. Wiebo Brouwer (RUG)  
Datum: 11 januari 2017

## 4.5 Outlook

Important activities in 2018 on Knowledge Transfer will be:

- TRAIL Internal PhD Congress
- TRAIL IenW cooperation:
  - Policy Relevance of TRAIL PhD Theses
  - Special Topics sessions
  - In house courses for IenW employees
- TRAIL International Summer school
- TRAIL IenW Masterclasses
- TRAIL IenW Summerschool

## 5. Concluding remarks

2017 was a relatively stable year: we did not implement many major changes. It was a unique year in terms of new PhD students, despite the longer term trend of reducing options for funding from NWO. This of course primarily the result of TRAIL staff members, not of the research school.

The links with the PhD council are very fruitful. Not only does the council in a pro active way provide nice suggestions, it also gives useful feedback on documents and ideas of the TRAIL office, and again helped organizing the TRAIL yearly conference.

TRAIL is very glad that the collaboration with the Ministry of Infrastructure and Water management will be continued, and that new forms of collaboration will be explored, at least offering in house courses based on courses developed for PhD students.

## Appendix 1: Overview of TRAIL Theses in 2017

*Strategic Modeling of Global Container Transport Networks: Exploring the future of port-hinterland and maritime container transport networks by Ronald Halim*

Uncertainties in future global trade flows due to changes in trade agreements, transport technologies or sustainability policies, will affect the patterns of global freight transport and, as a consequence, also affect the demand for major freight transport infrastructures such as ports and hinterland networks. Policy makers face the challenge of making robust policies and investments that sustain and promote economic development amidst the various uncertainties. This thesis proposes a set of empirically grounded quantitative models of global freight transport that can support strategic decision making about investments in freight transport infrastructures. We specify, estimate and validate these models for both maritime and hinterland transport, and apply them in comprehensive analyses of the EU's and the global container transport networks.

*Urban parking information provision: an in-depth effect analysis by Geert Tasseron*

Recent advances in wireless communication technologies, such as parking sensors, enable real-time information provision on on-street parking places to drivers. These developments have been embraced by policy makers, as they expect that real-time information may reduce traffic searching for a parking place, which sometimes accounts for as much as 30% of all traffic in a city center. Till today, these expectations have not been subjected to rigorous analyses. This PhD thesis shows, using a detailed parking simulation model, that the benefits to society of parking information are likely to be limited. The reduction in search time for drivers with access to information comes at a cost for drivers without access to the information technology. The net effect on search time is close to zero. Hence, information on on-street parking places is unlikely to have the expected positive benefits on noise and air pollution. Local authorities should be careful before committing to invest local funds in on-street parking information technology.

*Strategic Network Modelling for Passenger Transport Pricing by Erik-Sander Smits*

Innovative pricing measures for passenger transport, such as congestion charging, can change travellers' behaviour, and have the potential to make the transport system more sustainable. This dissertation presents a holistic strategic modelling framework to assess innovative pricing measures on transport networks. A game theoretical approach allows analysis of the decision making process of multiple stakeholders. In addition, in-depth analyses of macroscopic node models and route choice models are provided.

*Transport Networks, Land Use and Travel Behaviour: a Long Term Investigation by Dena Kasraian Moghaddam*

This thesis unravels the long-term relationships between transport networks, land use and travel behaviour at a regional scale. It investigates these relationships by applying various methods to an extensive long-term geo-referenced database, in the case of the Greater Randstad Area in the Netherlands. Its findings shed light on the roles of rail and road networks, land use and spatial policies on the development of cities and the travel behaviour of their inhabitants over time.

### *Consumer Heterogeneity, Transport and the Environment by Yashar Araghi*

While transport is essential for the functioning of the economy of each country, it is also contributing to CO<sub>2</sub> emissions and other externalities, like safety risks and noise exposure. According to the Internal Energy Agency, around 23% of global CO<sub>2</sub> emissions is related to the transport sector in 2015, making it second largest emitter after the energy sector (IEA, 2015). The energy sector has long started to stabilize its emissions through the large scale introduction of renewable and clean energy sources. If the transport sector continues to develop as before, this will make this sector perform even worse in terms of its relative emission contribution. Although top-down emission policies have been successful (for example, regulations regarding particulate filters), the increasing transport related emissions worldwide indicates that there is a need for more action. While regulations and technological innovations may decrease emissions, but not enough to reduce emissions to acceptable levels; behavioral change is also necessary (Bristow et al., 2008; Hickman & Banister, 2007). However, imposing behavioral restrictions may be associated with economic costs. Therefore, the existing dilemma is how to reduce the share of transport in global emissions while minimizing unfavourable economic implications.

### *Efficient Predictive Model-Based and Fuzzy Control for Green Urban Mobility by Anahita Jamshidnejad*

In this thesis, we develop efficient predictive model-based control approaches, including model-predictive control (MPC) and model-based fuzzy control, for application in urban traffic networks with the aim of reducing a combination of the total time spent by the vehicles within the network and the total emissions. The thesis includes three main parts, where in the first part the main focus is on accurate approaches for estimating the macroscopic traffic variables, such as the temporal-spatial averages, from a microscopic point-of-view. The second part includes efficient approaches for solving the optimization problem of the nonlinear MPC controller. The third and last part of the thesis proposes an adaptive and predictive model-based type-2 fuzzy control scheme that can be implemented within a multi-agent control architecture.

### *Situation Awareness for Socio Technical Systems by Shalini Kurapati*

Operating socio technical systems such as energy distribution networks, power plants, container terminals, and healthcare systems is a grand challenge. Decision making in these systems is complex due to their size, diversity, dynamism, social component, distributed nature, uncertainty, and vulnerability to disruptions. Human actors in these systems have to channel their pre-decision time to assess and classify current situation based on their individual or organizational goals rather than analyse possible alternatives for an optimal outcome. In this effect, Situation Awareness, a human factor required to perceive, comprehend and project the future of a current situation is considered to be an essential prerequisite for decision making in socio technical systems. Although the importance of Situation Awareness is well established it has not been studied extensively in socio technical systems. Therefore the key objective of this dissertation was to study the role of Situation Awareness on decision making and performance of individuals and teams in socio technical systems within the context of intermodal transport operations in container terminals.

### *Surface wear reduction of bulk solids handling equipment using bionic design, by Guangming Chen*

Bulk solids handling continues to play an important role in a number of industries. One of the issues during bulk solids handling processes is equipment surface wear. Wear results in high economic loss and increases downtime. Current wear reduction methods such as optimizing transfer conditions or using wear-resistant materials, have brought notable progress. Nevertheless, the wear loss is still significant. Therefore, new solutions for reducing the surface wear must be investigated. Because wear also occurs to the surfaces of many biological organisms, inspirations for wear reduction can be obtained from biology. In this research, the bionic design method is explored to reduce the surface wear of bulk solids handling equipment. This thesis firstly illustrates the analytical wear models in bulk solids handling. Hence, the wear phenomena in biology are investigated. Based on the analogies between biology and bulk solids handling, a bionic design method for wear reduction of bulk solids handling equipment surfaces is developed. Furthermore, two bionic models for reducing abrasive and erosive wear respectively, are proposed for the applications of bulk solids handling equipment surfaces. To model the effects of applying bionic models on the surface wear of bulk solids handling equipment, the discrete element method (DEM) is utilized. Using the parameter values obtained from experiments, the wear of bionic surfaces and conventional smooth surfaces is successfully modeled. By comparing predicted wear loss from bionic surfaces and smooth surfaces, the effectiveness of reducing wear by application of bionic models are successfully demonstrated. Moreover, parametric studies on geometrical parameters of bionic models were

also carried out. The results demonstrate that as biological wear reduction mechanisms are implemented, wear reduction of bulk solids handling equipment surfaces can be achieved. It is shown that abrasive wear loss can be reduced by up to 63% whilst erosive wear loss can be reduced by up to 26%.

*Integrated capacity assessment and timetabling models for dense railway networks by Nicola Besinovic.*

Mainline railways in Europe are experiencing increasing use as the worldwide demand for passenger and freight transport is growing across all transport modes. At the same time, much of the existing railway network is reaching its capacity and has become susceptible to disturbances. This thesis creates, optimizes, and evaluates railway timetables to promote more reliable, attractive and sustainable railway transport systems. In essence, we demonstrate that optimization, simulation and data analysis can be successfully applied to improving railway traffic planning and account for better infrastructure capacity use and increased level of service for passengers and freight operators.

*Energy saving for belt conveyors by speed control by Daijie He*

Belt conveyors are widely used in bulk solids handling and conveying systems. Considering the extensive use of belt conveyors, their operations involve a large amount of energy. Taking the relevant economic and social challenges into account, there is a strong demand for lowering the energy consumption of belt conveyors, and for reducing the carbon footprint. Speed control is one of the promising approaches for reducing the power consumption of belt conveyors. This thesis focuses on the application of speed control to belt conveyors for reducing their energy consumption. Research on belt conveyor speed control has already been carried out for more than twenty years. However, rare implementations of speed control to reduce energy consumption can be found in practice. One major reason is that the current research does not cover issues like the potential risks (such as the risk of belt over-tension, the risk of belt slippage around the drive pulley and the risk of motor over-heating) and the dynamic analyses of belt conveyors in transient operations. Therefore, speed control of belt conveyors is not often successfully applied in practice...

*Efficient Algorithms for Network-Wide Road Traffic Control by Goof van de Weg*

Controlling road traffic networks is a complex problem. One of the difficulties is the coordination of actuators, such as traffic lights, variable speed limits, ramp metering and route guidance, with the aim to improve the network performance over a near-future time horizon. This dissertation develops algorithms that specifically balance fast computation time and improved traffic network performance; both for freeway traffic in part I, and for urban traffic in part II.

*Train Trajectory Optimization Methods for Energy-Efficient Railway Operations by Pengling Wang*

Even though rail is more energy efficient than most other transport modes, the enhancement of energy efficiency is an important issue for railways to reduce their contributions to climate change further as well as to save costs and enlarge competition advantages involved. This thesis is motivated by the challenges in improving energy efficiency of train operations. The main objectives are to develop the modelling and solution methods for the train trajectory optimization problem to improve the model accuracy and the computation time, to apply the methods in a train driver advisory system development, and to develop a multi-train trajectory optimization method to solve the delay recovery and the energy-efficient timetabling problem.

*Fast Model Predictive Control Approaches for Road Traffic Control by Yu Han*

Traffic congestion has become a global issue that has a significant impact on our society's productivity. Its negative effects not only lie in the travel delays and unsafe conditions that it brings to road users, but also many aspects of our lives such as the air we all breathe. Construction and traffic management are typical alternatives for traffic researchers and practitioners to reduce congestion. Traffic management, which intends to make a better use of existing infrastructure, is more economical and environmentally friendly and becoming an increasingly preferred option. Dynamic traffic control proves to be efficient in the management of network traffic flows. This thesis focuses on the development of dynamic traffic control strategies to reduce congestion. Advanced dynamic traffic control strategies using model predictive control (MPC) approaches can considerably reduce traffic congestion.



MPC for traffic systems utilizes a traffic model to predict traffic states evolutions based on the current states of the system, and determines the optimal control actions that result in the optimum value of an objective function. This feature enables the controller to take advantage of potentially larger future gains at a current (smaller) cost, so as to avoid myopic control actions...

*The Design, Planning and Execution of Sustainable Intermodal Port-hinterland Transport Networks by Panagiotis Ypsilantis*

Globalization has led to a tremendous growth of international trade over the last century amounting to \$18.8 trillion in 2014. Approximately 90% of non-bulk cargo is transported in shipping containers. The dominant mode in container transportation is maritime, in which containers are transported from a seaport to another seaport around the globe. Import containers are discharged in seaport container terminals and are destined to inland locations, a reverse process happens for export containers. The inland terminals can be close or far away from the seaport terminals where the containers were discharged.

The container transport between the seaport and the inland locations is called port-hinterland transportation. Given the specific physical characteristics and infrastructure of each area this part of the transportation chain can be performed via trucks, trains or river vessels. The sequential use of multiple transport modes in port-hinterland transport is called combined transport. The main aim of this study is to analyze the port-hinterland transportation process and to develop models that support the design, planning and execution of port-hinterland transportation networks with high capacity modes such as barges and trains.

## Appendix 2: TRAIL Staff Members on 31-12-2017

<b>Title</b>	<b>Name</b>			<b>University and faculty</b>
<b>Dr. ir.</b>	N.A.H.		Agatz	Erasmus Universiteit Rotterdam -RSM
<b>Dr.</b>	J.A.		Annema	Technische Universiteit Delft-Fac. Techniek, Bestuur en Management
<b>Prof. dr. ir.</b>	B.	van	Arem	Technische Universiteit Delft-Fac. Civiele Techniek en Geowetenschappen
<b>Prof. dr. ir.</b>	E.C.	van	Berkum	Universiteit Twente - Faculteit Construerende Technische Wetenschappen
<b>Dr. ir.</b>	A.J.J.	van den	Boom	TU Delft- Fac. Werktuigbouwkunde, Maritieme Techniek & Technische Materiaalwetenschappen
<b>Prof. dr.</b>	K.A.		Brookhuis	Rijksuniversiteit Groningen - Faculteit der Gedrags- en Maatschappijwetenschappen
<b>Dr.</b>	O.		Cats	Technische Universiteit Delft-Fac. Civiele Techniek en Geowetenschappen
<b>Prof. dr. ir.</b>	C.G.		Chorus	Technische Universiteit Delft-Fac. Techniek, Bestuur en Management
<b>Dr. ir.</b>	F.		Corman	TU Delft- Fac. Werktuigbouwkunde, Maritieme Techniek & Technische Materiaalwetenschappen
<b>Dr. ir.</b>	G.		Correia	Technische Universiteit Delft-Fac. Civiele Techniek en Geowetenschappen
<b>Prof.</b>	R.		Curran	Technische Universiteit Delft - Faculteit der Luchtvaart- en Ruimtevaarttechniek
<b>Dr. ir.</b>	W.		Daamen	Technische Universiteit Delft-Fac. Civiele Techniek en Geowetenschappen
<b>Prof. dr. ir.</b>	B.		De Schutter	TU Delft- Fac. Werktuigbouwkunde, Maritieme Techniek & Technische Materiaalwetenschappen
<b>Prof. dr. ir.</b>	R.		Dekker	Erasmus Universiteit Rotterdam - Faculteit der Economische Wetenschappen
<b>Dr.</b>	H.F.		Farah	Technische Universiteit Delft-Fac. Civiele Techniek en Geowetenschappen
<b>Dr.</b>	M.S.	van	Geenhuizen	Technische Universiteit Delft-Fac. Techniek, Bestuur en Management
<b>Prof. dr.</b>	H.		Geerlings	Erasmus Universiteit Rotterdam - Faculteit der Sociale Wetenschappen
<b>Prof. dr. ir.</b>	K.T.		Geurs	Universiteit Twente - Faculteit Construerende Technische Wetenschappen
<b>Prof. dr.</b>	R.M.P.		Goverde	Technische Universiteit Delft-Fac. Civiele Techniek en Geowetenschappen
<b>Prof. dr.</b>	J.P.M.		Groenewegen	Technische Universiteit Delft-Fac. Techniek, Bestuur en Management
<b>Prof. dr.</b>	M.P.		Hagenzieker	Technische Universiteit Delft-Fac. Civiele Techniek en Geowetenschappen
<b>Dr. ir.</b>	A.		Hegyí	Technische Universiteit Delft-Fac. Civiele Techniek en Geowetenschappen
<b>Prof. dr. ir.</b>	R.E.C.M.	van der	Heijden	Radboud Universiteit Nijmegen - Faculteit der Managementwetenschappen
<b>Prof. dr. ir.</b>	J.		Hellendoorn	TU Delft- Fac. Werktuigbouwkunde, Maritieme Techniek & Technische Materiaalwetenschappen
<b>Prof. dr. ir.</b>	S.P.		Hoogendoorn	Technische Universiteit Delft-Fac. Civiele Techniek en Geowetenschappen
<b>Dr.</b>	M.		Janic	Technische Universiteit Delft-Fac. Civiele Techniek en Geowetenschappen
<b>Dr.</b>	V.L.		Knoop	Technische Universiteit Delft-Fac. Civiele Techniek en Geowetenschappen
<b>Prof. dr.</b>	M.B.M.	de	Koster	Erasmus Universiteit Rotterdam -RSM

<b>Dr. ir.</b>	M.		Kroesen	Technische Universiteit Delft-Fac. Techniek, Bestuur en Management
<b>Dr. ir.</b>	F.A.		Kuipers	Technische Universiteit Delft - Faculteit Electrotechniek, Wiskunde & Informatica
<b>Dr. ir.</b>	J.H.		Kwakkel	Technische Universiteit Delft-Fac. Techniek, Bestuur en Management
<b>Prof. ir.</b>	H.		Ligteringen	Technische Universiteit Delft-Fac. Civiele Techniek en Geowetenschappen
<b>Prof. dr. ir.</b>	J.W.C.	van	Lint	Technische Universiteit Delft-Fac. Civiele Techniek en Geowetenschappen
<b>Dr. rer. soc.</b>	H.K.		Lukosch	Technische Universiteit Delft-Fac. Techniek, Bestuur en Management
<b>Prof. dr. ir.</b>	V.A.W.J.		Marchau	TRAIL Research School
<b>Dr.</b>	K.		Martens	Radboud Universiteit Nijmegen - Faculteit der Managementwetenschappen
<b>Prof. dr.</b>	M.H.		Martens	Universiteit Twente - Faculteit Construerende Technische Wetenschappen
<b>Prof. dr.</b>	H.J.		Meurs	Radboud Universiteit Nijmegen - Faculteit der Managementwetenschappen
<b>Dr.</b>	E.J.E.		Molin	Technische Universiteit Delft-Fac. Techniek, Bestuur en Management
<b>Prof. dr.</b>	R.R.		Negenborn	TU Delft- Fac. Werktuigbouwkunde, Maritieme Techniek & Technische Materiaalwetenschappen
<b>Dr. ir.</b>	R.	van	Nes	Technische Universiteit Delft-Fac. Civiele Techniek en Geowetenschappen
<b>Dr.</b>	S.		Rasouli	Technische Universiteit Eindhoven
<b>Dr.</b>	J.		Riezebos	Rijksuniversiteit Groningen-Fac. Economie en Bedrijfskunde
<b>Prof. dr.</b>	K.J.		Roodbergen	Rijksuniversiteit Groningen-Fac. Economie en Bedrijfskunde
<b>Dr. rer. Nat.</b>	M.E.		Schmidt	Erasmus Universiteit Rotterdam -RSM
<b>Dr. ir.</b>	D.L.		Schott	TU Delft- Fac. Werktuigbouwkunde, Maritieme Techniek & Technische Materiaalwetenschappen
<b>Dr.</b>	S.		Sharif Azadeh	Erasmus Universiteit Rotterdam - Faculteit der Economische Wetenschappen
<b>Prof. dr. ir.</b>	L.A.		Tavasszy	Technische Universiteit Delft-Fac. Techniek, Bestuur en Management
<b>Prof. dr.</b>	R.H.		Teunter	Rijksuniversiteit Groningen-Fac. Economie en Bedrijfskunde
<b>Prof. dr.</b>	H.J.P.		Timmermans	Technische Universiteit Eindhoven
<b>Dr.</b>	W.W.		Veeneman	Technische Universiteit Delft-Fac. Techniek, Bestuur en Management
<b>Dr.</b>	J.		Veldman	Rijksuniversiteit Groningen-Fac. Economie en Bedrijfskunde
<b>Prof. dr. ir.</b>	A.		Verbraeck	Technische Universiteit Delft-Fac. Techniek, Bestuur en Management
<b>Prof. dr.</b>	I.F.A.		Vis	Rijksuniversiteit Groningen-Fac. Economie en Bedrijfskunde
<b>Prof. dr.</b>	D.	de	Waard	Rijksuniversiteit Groningen - Faculteit der Gedrags- en Maatschappijwetenschappen
<b>Dr.</b>	M.		Wang	Technische Universiteit Delft-Fac. Civiele Techniek en Geowetenschappen
<b>Prof. dr.</b>	G.P.	van	Wee	Technische Universiteit Delft-Fac. Techniek, Bestuur en Management

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<b>Dr.</b>	M.M.	de	Weerdt	Technische Universiteit Delft - Faculteit Electrotechniek, Wiskunde & Informatica
<b>Prof. ir.</b>	F.C.M.		Wegman	Technische Universiteit Delft-Fac. Civiele Techniek en Geowetenschappen
<b>Dr.</b>	B.		Wiegman	Technische Universiteit Delft-Fac. Civiele Techniek en Geowetenschappen
<b>Prof. dr.</b>	C.		Witteveen	Technische Universiteit Delft - Faculteit Electrotechniek, Wiskunde & Informatica
<b>Prof. dr. ir.</b>	J.C.		Wortmann	Rijksuniversiteit Groningen - Faculteit Bedrijfskunde
<b>Dr.</b>	S.X.		Zhu	Rijksuniversiteit Groningen-Fac. Economie en Bedrijfskunde
<b>Prof. dr.</b>	R.A.		Zuidwijk	Erasmus Universiteit Rotterdam -RSM

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## Appendix 3: Overview of TRAIL PhD projects on 31-12-2017

<b>A. Transport &amp; Mobility</b>			
Program leaders: Chorus, Meurs, Timmermans			
<b>Synthesis of Machine Learning and Choice Modeling</b>	<b>Ahmad</b>	<b>Alwosheel</b>	<b>TUD</b>
<b>Urban Transport, Accessibility, Social Exclusion and Governance in Metropolitan Areas in Indonesia</b>	Ayu	Andani	UT
<b>New Discrete Choice Theory for Understanding Moral Decision Making Behaviour</b>	Tom	Berg, van den	TUD
<b>Interface Design for Transitions between Manual and Automated Driving</b>	Anika	Boelhouver	UT
<b>Activity Based Model of Travel Demand</b>	Valeria	Caiati	TUE
<b>Activity-Based Travel Demand Modeling under Uncertainty</b>	Eleni	Charoniti	TUE
<b>The Impact of Time on the Relationship between Travel Behaviour and the Built Environment</b>	Paul	Coevering, van de	TUD
<b>The Relationship between Road Safety, Infrastructure and Driving Behaviour on 80 km/h Roads</b>	Kirsten	Duivenvoorden	TUD
<b>SCRIPTS: A New Generation of Activity-based Models of Travel Demand</b>	Anna-Maria	Feneri	TUE
<b>An Asset Management Approach for Railway Systems</b>	Randy	Fischer	TUD
<b>Analysis of Transportation Mode Between central City and New Towns using Activity-Based Approach</b>	Jia	Guo	TUE
<b>Integrating Realistic Demand Models in Public Transport Optimization</b>	Johann	Hartleb	EUR
<b>The Next Frontier in Random Regret Minimization Modeling</b>	Bing	Huang	TUD
<b>Housing Mobility in Historical Blocks in China</b>	Wen	Jiang	TUE
<b>Matching Public Transport Networks to Land-Use Patterns in Medium-Sized Metropolitan Regions</b>	Kasper	Kerkman	RUN
<b>Automated Driving in Freight Transport Truck Platooning</b>	Anirudh	Kishore Bhoopalam	EUR
<b>Cycling, Gender and Transport Poverty</b>	Angela	Kloof, van der	RUN
<b>Uncertainty and Cost-Effectiveness of Policy Measures to Reduce CO2 Emissions from Transport</b>	Robert	Kok	TUD
<b>Governance of Networks of Transport and Land-use</b>	Sara	Levy	RUN
<b>Consumer Preferences for Electric Vehicles</b>	Fanchao	Liao	TUD

<b>The Influence of Built Environment on Pedestrian and Cyclist Behavior around Metro/Railway Station</b>	Yanan	Liu	TUE
<b>Infrastructure Service Network Design for Automated Vehicles</b>	Bahman	Madadi	TUD
<b>Travel and Location Choice Behaviour of Prospective Automated Vehicle Users</b>	Baiba	Pudane	TUD
<b>Moral Discrete Choice Theory</b>	Teodora	Szep	TUD
<b>Policy Implications of Travel Time Budgets</b>	Maarten	t Hoen	TUD
<b>Advanced Monitoring of Intelligent Rail Infrastructure</b>	Kim	Verbert	TUD
<b>A New Approach to Transport Modelling by Using Ubiquitous Data: the activity-space model</b>	Wang	Yihong	TUD
<b>Smart Incentives for Sustainable Travel Behaviour</b>	Nadja	Zeiske	RUG

<b>B. Infrastructure &amp; Traffic Management</b>			
<b>Program leaders: Hoogendoorn, Van Berkum</b>			
<b>Modeling of Road Traffic Noise, with an application in Kermanshah, Iran</b>	Seyed Shaho	Ahmadi Dehrashid	TUD
<b>Mobility Forecasting and Evaluation of Responsive Intelligent Public Transport Systems</b>	Maria	Alonso Gonzalez	TUD
<b>Turbulent Traffic - The Impact of Traffic Turbulence on Safety and Operations</b>	Aries	Beinum, van	TUD
<b>Development of a Methodology to Assess Ports and Waterways on Capacity and Safety</b>	Xavier	Bellsolà Olba	TUD
<b>STAQ: Static Traffic Assignment with Queuing</b>	Luuk	Brederode	TUD
<b>Autonomous Control for Cooperative Multi-Vessel System</b>	Linying	Chen	TUD
<b>Scenario-based Multi-objective Automated Driving Strategies from Safe and Efficient Traffic</b>	Na	Chen	TUD
<b>Dynamic Assessment of Multi-modal Transport Systems</b>	Gijs	Eck, van	TUD
<b>Online Route Planning in Response to Non-Recurrent Traffic Disruptions</b>	Oskar	Eikenbroek	UT
<b>Potential of Increasing Road Vehicle Automation for Traffic Management Application</b>	Paul	Erp, van	TUD
<b>Traffic Information as a Tool to Bridge the Gap between User Optimum and System Optimum</b>	Mariska	Essen, van	UT
<b>The Use of VR/AR to Determine Pedestrian Walking and Travel Choice Behaviour</b>	Yan	Feng	TUD
<b>Theory and Microscopic Modelling of Active Traffic Behaviour</b>	Alexandra	Gavriilidou	TUD
<b>The Human Factors (User Acceptance/Safety) Side of a Change Assistant System</b>	Paul	Gent, van	TUD
<b>Railway Microscopic Simulation Framework for S&amp;G Study</b>	Nadjla	Ghaemi	TUD

<b>Active Mode Research Based on Social Media Data</b>	Xun	Gong	TUD
<b>Optimal Multimodal Network Management for Urban Emergencies</b>	Jeroen	Gun, van der	TUD
<b>Designing and Managing the Transfer Function of Train Stations</b>	Jeroen	Heuvel, van den	TUD
<b>EMPOWER People to Reduce Car Traffic</b>	Bingyuan	Huang	UT
<b>Travel Behaviour and Traffic Operations in Case of Exceptional Events</b>	Mahtab	Joueiai	TUD
<b>Crowd Behaviour under Exceptional Conditions</b>	Erica	Kinkel	TUD
<b>Naturalistic Driving Observation to Study Navigation Support Safety and Efficiency</b>	Allert	Knapper	TUD
<b>Stakeholder Acceptability of Smart Pricing Measures</b>	Lizet	Krabbenborg	TUD
<b>Automatic Multiscale Graph Generation from Geographical Data</b>	Panchamy	Krishnakumari	TUD
<b>Design of Network Wide Traffic Management System</b>	Ramon	Landman	TUD
<b>Airline/ATM Network Performance and Optimization</b>	Yalin	Li	TUD
<b>Demand Forecasting and Operational Strategies for Automated Taxis</b>	Xiao	Liang	TUD
<b>Cross Project Learning by an International Project Base of Large Infrastructure Projects</b>	Yan	Liu	TUD
<b>Modelling Traffic Operations and Capacity Considering Driving Behaviours and Cooperative Driving at Signalized intersections</b>	Meiqi	Liu	TUD
<b>Setting Criteria for Safe Driving Behaviour on the Road</b>	Roald	Loon, van	UT
<b>Short-term Traffic Prediction</b>	Ding	Luo	TUD
<b>Connected Driver Assistance and Traffic Management</b>	Niharika	Mahajan	TUD
<b>Impacts of Automated Driving on Traffic Flow</b>	Freddy	Mullakkal Babu	TUD
<b>Lane-specific Traffic Flow Control Models</b>	Hari Hara Sharan	Nagalur Subraveti	TUD
<b>Hybrid Model for freeway Traffic State Estimation and Prediction using Traffic Flow Theory and Historical Data</b>	Tin	Nguyen	TUD
<b>Interactions of Automated Driving and Vulnerable Road Users, and Implications of Automated Driving on Traffic Safety and Urban Design</b>	Juan Pablo	Núñez Velasco	TUD
<b>Methodology Development for Crowd/Cyclist Management and Control</b>	Tim	Oijen, van	TUD
<b>Dynamics in Mode Choice Behaviour</b>	Marie-José	Olde Kalter	UT
<b>Creative Re-Designing of Urban Public Space in the Era of Automated Driving, Vehicle Sharing and Electrification</b>	Maryna	Ozturker	TUD
<b>Line Plan Evaluation and Timetabling</b>	Gert-Jaap	Polinder	EUR
<b>Energy-Efficient Timetable Design</b>	Gerben	Scheepmaker	TUD

<b>Establishing which Factors Determine the Route and Activity Choices for Active Mode Travelers in an Urban Environment based on Empirical Data</b>	Florian	Schneider	TUD
<b>Maritime Traffic Model for Increased Safety and Capacity of Ports and Waterways</b>	Yaqing	Shu	TUD
<b>Demand Responsive Transport Systems in SCRIPTS project</b>	Jishnu Narayan	Sreekantan Nair	TUD
<b>Multi-Agent Game Theoretic Approaches for Service Contracting in Railway Operations</b>	Zhou	Su	TUD
<b>A Multimodal Multi-Scale Traffic Model</b>	Guus	Tamminga	TUD
<b>Modelling Route Choice and Activity Scheduling for Active Modes</b>	Danique	Ton	TUD
<b>Human Factors of Automated Driving: predicting real-world effects of automated driving</b>	Silvia	Varotto	TUD
<b>Sensing Platform: monitoring, modelling and forecasting urban mobility through interactions of connected autonomous vehicles and active modes</b>	Alphonse	Vial	TUD
<b>Usage of Recorded Actual Travel Data for Long-term Demand Prediction</b>	Jord	Vliet, van der	TUD
<b>Human Factors in Self-Driving Cars</b>	Francesco	Walker	UT
<b>Macroscopic Modelling of Active Mode Traffic</b>	Marie-Jette	Wierbos	TUD
<b>Urban Parking Management in the Times of Shared (Automated) Mobility</b>	Konstanze	Winter	TUD
<b>Using Cooperative ACC to form High-performance Vehicle Streams</b>	Lin	Xiao	TUD
<b>The Design of High-Speed Railway Passenger Service Plans from a Multimodal Transport Perspective</b>	Fei	Yan	TUD
<b>Measuring, Modelling and Improving Reliability and Robustness of Urban Public Transport in a Multi-Level Context: a passenger perspective</b>	Menno	Yap	TUD
<b>Driver Behaviour in the Transport of Control between Manual and Automated Driving</b>	Bo	Zhang	UT
<b>Nautical Traffic Modelling for Safe and Efficient Ports</b>	Yang	Zhou	TUD
<b>Passenger Oriented Disruption Management in Railway</b>	Yongqiu	Zhu	TUD
<b>Theory and Modelling of Acquiring, Processing and Storing Spatial Knowledge</b>	Lara-Britt	Zomer	TUD
<b>Using a Network Approach on Modelling Traffic Flow: applying the model to cases in Amsterdam and Rotterdam</b>	Boudewijn	Zwaal	TUD



<b>C. Logistics and Transport Organization</b>			
<b>Program leaders: De Koster, Tavasszy, Vis</b>			
<b>Multi-Level Control of Large-Scale Logistic Systems</b>	Yashar	Zeinaly	TUD
<b>Dynamic Contracting in Infrastructures</b>	Joris	Scharpff	TUD
<b>Modelling and Optimization on Local Traffic Networks</b>	Yu	Hu	TUD
<b>Revenue Management and complexity in Public Transport</b>	Paul	Bouman	EUR
<b>Assessing the Gain of Sharing Demand Forecast in FMCG Supply Chains</b>	Clint	Pennings	EUR
<b>Evaluating Intermodal Freight Transport &amp; Logistics Markets</b>	Hamid	Saeedi	TUD
<b>Design and Control of Autonomous Vehicle Storage and Retrieval Systems</b>	Masoud	Mirzaei	EUR
<b>Hinterland Network Transportation of Containers</b>	Bart	Riessen, van	EUR
<b>Intelligent Monitoring of Railway Equipment</b>	Alireza	Alemi	TUD
<b>Development of Dutch Biomass Infrastructure</b>	Ioannis	Dafnomilis	TUD
<b>Green Port Initiatives and Environmental Fleet Investment</b>	Xishu	Li	EUR
<b>Simultaneous Management of Transfers on Railway Networks for Passengers and Freight Flows</b>	Wenhua	Qu	TUD
<b>Integration and Modernization of Transportation Systems</b>	Xiao	Lin	TUD
<b>Study and Optimization of the Interface between Railway Network, Container Ports/Mainports and Freight Bundling Facilities</b>	Qu	Hu	TUD
<b>Multi-channel Inventory Control</b>	Arjan	Dijkstra	RUG
<b>Information Integration for Intelligent Control of Logistics and Transport Systems</b>	Fan	Feng	TUD
<b>Sustainable Logistics in Fresh Food (SLIFF)</b>	Roel	Post	RUG
<b>Vehicle Routing Methods for Parcel Delivery</b>	Marjolein	Veenstra	RUG
<b>Performance Interaction Model</b>	Alf	Smolders	TUD
<b>Analysis of Autonomous Vehicle Storage and Retrieval Systems (AVSRS)</b>	Kaveh	Azadeh	EUR
<b>Sustainable Logistics in Fresh Food</b>	Arpan	Rijal	EUR
<b>Decision Making on Distribution Structures and Distribution Centre Locations</b>	Sander	Onstein	TUD
<b>Incentives for Renewable Energy</b>	Jose Alejandro	Lopez	RUG
<b>Integrated Synchronodal Transport System Analysis</b>	Masoud	Khakdaman	TUD
<b>Effective Use of Reefer Containers through the Port of Rotterdam: a transitions oriented approach</b>	Bob	Castelein	EUR
<b>Consolidation of Transportation Flows in Multi-Channel Retail</b>	Joydeep	Paul	EUR
<b>The Development of Multi-Level Capacity Control Mechanisms in Synchronodal Transport</b>	Hobbs	White	EUR
<b>A Green Vertical Transport Plan of Deep Sea Mining Systems</b>	Wenbin	Ma	TUD

<b>Integrated Optimization in Equitable Train Scheduling from Planning to Operation</b>	Xiaojie	Luan	TUD
<b>Developing Efficient Methods for the Robust Management of Fleets of Cooperative (Automated) Vehicles</b>	Johan	Los	TUD
<b>Residual Ultimate Strength of Damaged Metallic Pipelines</b>	Jie	Cai	TUD
<b>Synchromodal Transport</b>	Alberto	Giudici	EUR
<b>Dynamic Fleet Management of Automated Vehicles</b>	Breno	Alves Beirigo	TUD
<b>Physical Internet</b>	Patrick	Fahim	TUD
<b>Synchromodal Transportation in Multinational Cold Chains</b>	Wenjing	Guo	TUD
<b>Composite Indicators of Company Performance for Truck Manufacturers</b>	Qinqin	Zeng	TUD
<b>Supply Chain Disruption Management</b>	Bahareh	Zohoori	TUD
<b>Collaboration Mechanisms Design for Green Supply Chain</b>	Kailan	Wu	TUD

**\* 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

