Year Report 2016
TRAIL Research School

TRAIL Research School, February 2017

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Contents

Selected Highlights TRAIL Research School 2016

- 27 PhD-students received their PhD-degree

- 43 new PhD-students started at TRAIL

- 2 new Associate staff members joined TRAIL

- TRAIL organized 12 PhD courses and 7 master classes

- TRAIL initiated (together with research school NETHUR) a 2-week course for starting researchers within the -Sustainable Urban Regions of the Future program (NWO); the 1st SURF week in October was a big success

- TRAIL organised a very successful TRAIL PhD congress in Utrecht in November

- TRAIL organised 7 Masterclasses and a Summer school for I&M employees

- Serge Hoogendoorn was appointed Distinguished Professor by the Delft University of Technology in the field of Smart Urban Mobility

- Caspar Chorus received an ERC grant for his Modelling Moral Decision Making proposal

- Several NWO proposals granted in the program 'Complexity in Transport & Logistics'

Ministerie van Infrastructuur en Milieu

NWO

Beta
Research School for Operations
Management and 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 behavioural 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 31-12-2016 TRAIL counted 58 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: [1]
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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[1] See www.rstrail.nl for the current members of the different bodies

2. Training & Education

Training & Education is the core activity of the TRAIL Research School. In 2016 TRAIL performed the following activities:

- The organisation of 12 PhD courses and 7 master classes
- The organisation of the 2nd 1.5-year cycle of the graduate program with Research School Beta on Operations Management and Logistics (GP-OML)
- The implementation of the 2nd part of the graduate program with MSc TIL (granted by NWO)

2.1 TRAIL courses and master classes in 2016

The new TRAIL T&E program (as, implemented in 2014) was slightly updated in 2015 and 2016 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[2] 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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[2] 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

I TRAIL Basic Courses [1]	*By*	*Part* [2]	*ECTS* [3]
TRAIL Fundamental Domain Knowledge – (4d) [4]	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

II General TRAIL Courses [1]	*By*	*Part* [2]	*ECTS* [3]
TRAIL Data-analysis and Statistics (3d) [4]	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

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

[1] Between brackets number of course days

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

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

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

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

Table 2: TRAIL courses given in 2016

Title	Start date	No. days	Course leader(s)	ECTS	Part.
Stated Preference Data Collection Discrete Choice Modelling	21 Jan.	3	Chorus, Timmermans	1 - 3	19
Introduction to TRAIL and the PhD Process	18 Feb.	0.5	Van Wee	0.25	7
Writing a Literature Review in the TIL-Domain	24 Mar.	2	Van Wee	1 - 4	16
TRAIL Theories and Methods	31 Mar.	3.5	Marchau	1 - 3	20
Societal Relevance of your PhD Research	19 May	0.5	Annema, Van Wee	0.25 - 1	11
Introduction to TRAIL and the PhD Student Process	26 Sep.	0.5	Marchau, Van Wee	0.25	15
Writing & Publishing a 'TRAIL' Research Article	3 Oct.	1	Chorus, Marchau	0.5 - 1	25

Table 3: TRAIL/Beta GP-OML courses given in 2016

Title	Start date	No. days	Course leader(s)	ECTS	Part.
Quantitative Modeling and Analysis of Supply Chains	9 Mar.	4	De Kok	1 - 4	12
Freight Transport Management	23 Mar.	4	Coelho / Vis	1 - 4	10
Advanced Inventory Theory	14 Sep.	3	Dekker, Van Houtum	*0.5 - 2*	11
Transport Logistics Modelling	2 Nov.	4	Tavasszy, Zuidwijk	1 - 4	21

In addition, regular Master classes by (inter)national renowned scholars are offered by TRAIL (see Table 4). TRAIL organises these Master classes in the 'slipstream' of public defences of PhD's on topics related to the PhD dissertation and with input of (often international) scientists that are member of the promotion committee.

Table 4: TRAIL Master classes of 2016

Title	Date	No. days	Course leader(s)	Part.
Road Traffic Modelling and Control	23 Mar.	0.5	Papageorgiu, Knoop, Van Lint, Buisson	33
Future Implementation of Road Pricing	8 June	0.5	Rye, Reiding, Spit	39
Sustainable Supply Chain Management and Logistics	16 Sept.	0.5	Sarkis, Yusuf, Tavasszy	18
The Analysis and Modelling of Pedestrian Movement Dynamics	10 Oct.	0.5	Seyfried, Sarvi, Mahmassani	25
Pedestrians in Urban Areas: behaviour and modelling	21 Nov.	0.5	Goatin, Bandini	10
Design and Modelling of Evacuation Measures	12 Dec.	0.5	Helsloot, Antoniou, Wolshon	22
Mysteries on Motorway Traffic Operations: breakdowns and the capacity drop	14 Dec.	0.5	Taale, Ahn, Laval, Tampère	17

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 12 course days are available. Each semester, three 4-day courses are given on a fixed day (Wednesday) every week at a central location in The Netherlands;
- Each course will be 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   The TRAIL Graduate School program

Within NWO's Graduate Program (GP), research schools and graduate schools can apply for funding. With the funding the research and graduate schools can further strengthen the education and research programs for the development of young scientific talent. In 2013, a total of 32 schools applied for funding and 18 of these received a grant of 800,000 euros for the appointment of 4 or 5 PhD students. TRAIL was one of these schools!

Bert van Wee (TRAIL), Hans van Lint (TUD/TIL), and Vincent Marchau (TRAIL) successfully applied for this grant. This enabled 5 excellent students (students within MSc TIL/TU or students with equal qualifications) 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 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 2017 the progress of these PhD students will be evaluated in line with the NWO-GP mid-term requirements.

2.4   Origins of PhD students

The Table below indicates the origin of starting PhD students within TRAIL within the period of 2010-2016. The figures show that:
- There is a strong increase in TRAIL PhD students, despite the decreasing traditional research funding opportunities (e.g. NWO)
- Most students originate from The Netherlands or China (except for 2014 (The Netherlands) and 2013 (China))
- Other countries than the Netherlands and China contribute to the increase in TRAIL PhD students in 2016 compared to 2015.

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 succesfull in acquiring funding within larger research programs (e.g. NWO-SURF, ERC, Chinese Scholarship program)

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

2.5 TRAIL Training and Education outlook

The education activities mentioned in section 2.1-2.3 will be continued in 2017 and further. In addition, TRAIL will organize, together with Research School NETHUR, a the second week of the education program for researchers (PhD students, junior researchers, etc.) working within the NWO program Sustainable Urban Regions for the Future (SURF) program. The course topics will focus on co-creation within SURF-consortia and knowledge dissemination of SURF-findings (the first week in 2016 focused on domain specific knowledge (urban innovations, urban system knowledge and evaluation).

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[3])
    a.   Drivers' Behavior
    b.   (Dynamic) Traffic Management
    c.   Intelligent Transport Systems
C. Logistics and Transport Organisation (leaders: De Koster, Tavasszy, Lodewijks, Vis)
    a.   Logistics and Supply Chain Management
    b.   Transport (Service) Networks
    c.   Network Design.

3.1   PhD Research

Dissertations

In 2016, 27 TRAIL PhD students received a PhD degree, of which three did not publish their thesis in the TRAIL thesis series as they preferred or had to select another publisher (topic outside the TIL domain). Two non-formally as TRAIL PhD students registered PhD students however did publish their thesis in the TRAIL series, because they were supervised by a TRAIL staff member. Consequently in total 26 theses were published in 2016 in the TRAIL thesis series (see Table 5). In Appendix 1 the summaries of these theses are given.

Table 5: TRAIL PhD theses 2016

Title	Name	University[1]	Month of Defense
Condition-Based Maintenance for Complex Systems: Coordinating maintenance and logistics planning for the process industries	Minou Olde Keizer	RUG	December
Coordination of Waterborn AGVs	Huarong Zheng	DUT	December
Capacity Drop on Freeways: Traffic dynamics, theory and Modeling	Kai Yuan	DUT	December
Coordinated Planning of Inland Vessels for Large Seaports	Shijie Li	DUT	December
The Influence of Herding on Departure Choice in Case of Evacuation: Design and analysis of a serious gaming experimental set-up	Mignon van den Berg	DUT	December
Multi-Agent Control of urban Transportation Networks and of Hybrid Systems with Limited Information Sharing	Renshi Luo	DUT	November
Microscopic Modelling of Walking Behavior	Mario Campanella	DUT	November
Coordination in Hinterland Chains: An institutional analysis of port-related transport	Martijn van der Horst	DUT/EUR	November

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[3] 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..

Securing Safety: Resilience time as a hidden critical factor	Wim Beukenkamp[2]	DUT	October
Articles on Parking Policy	Giuliano Mingardo[2]	DUT	October
Analysis and Modelling of Pedestrian Movement Dynamics at Large-scale Events	Dorine Duives	DUT	October
Contextual Factors of Sustainable Supply Chain Management Practices in the Oil and Gas Industry	Karimah Wan Ahmad	DUT	September
Prediction of Belt Conveyor Idler Performance	Xiangwei Liu	DUT	September
Stochastic Models for Order Picking Systems	Jelmer van der Gaast	EUR	September
Practice Oriented Algorithmic Disruption Management in Passenger Railways	Joris Wagenaar	EUR	September
A Bounded Rationality Model of Short and Long-Term Dynamics of Activity-Travel Behavior	Ifigeneia Psara	EUT	June
The Use of Advanced Transportation Monitoring Data for Official Statistics	Yingyi Ma	EUR	June
Coordinated Model Predictive Control of Synchromodal Freight Transport Systems	Le Li	DUT	June
Road Pricing Policy Implementation	Diana Vonk Noordegraaf	DUT	June
Modeling, Robust and Distributed Model Predictive Control for Freeway Networks	Shuai Liu	DUT	May
Stochastic Macroscopic Analysis and Modelling for Traffic Management	Simeon Calvert	DUT	May
Reliable Timetable Design for Railways and Connecting Public Transport Services	Daniel Sparing	DUT	May
Uncertainty in Modeling Activity-Travel Demand in Complex Urban Systems	Soura Rasouli	EUT	March
Traffic Flow at Sags: Theory, Modeling and Control	Bernat Goñi-Ros	DUT	March
Behavioral Operations in Logistics	Jelle de Vries	EUR	February
Effects of Pricing Strategies on Dynamic Repertoires of Activity-Travel Behaviour	Elaheh Khademi	EUT	February

[1] *DUT – Delft University of Technology*
EUR – Erasmus University Rotterdam
EUT – Eindhoven University of Technology
RUG – University of Groningen

[2] *Non-TRAIL PhD student, thesis supervisor is TRAIL Staff Member*

In 2016, 43 PhD students started at TRAIL. This is a new record for TRAIL. Table 6 gives an overview of these new projects.

Table 6: Newly started PhD students at TRAIL in 2016

Name	Project	Univ.	Fac.	Sponsor
Ahmad Alwosheel	Synthesis of machine Learning and choice Modeling	DUT	TPM	KACST
Ayu Andani	Urban Transport, Accessibility, Social Exclusion and Governance in Metropolitan Areas in Indonesia	UT	CTW	Government funding
Madadi Bahman	Infrastructure Service network Design for Automated Vehicles	DUT	CEG	
Anika Boelhouwer	Interface Design for Transitions between Manual and Automated Driving	UT	CTW	
Jie Cai	Residual Ultimate Strength of Damaged Metallic Pipelines	DUT	3ME	CSC
Valeria Caiati	Activity Based Model of Travel Demand	EUT	BE	
Bob Castelein	Effective Use of Reefer Containers through the Port of Rotterdam: a transitions oriented approach	EUR	FSW	NWO, part external
Na Chen	Scenario-based Multi-objective Automated Driving Strategies for Safe and Efficient Traffic	DUT	CEG	CSC
Shima Ebrahimigharehbaghi	Governance of Smart City Public Transport	RUN	NSM	
Anna-Maria Feneri	SCRIPTS: A New Generation of Activity-based Models of Travel Demand	EUT	BE	
Ilse Galama	Planning and Design Guidelines of Pedestrian and Cyclist in Cities	DUT	CEG	
Alexandra Gavriilidou	Theory and Microscopic Modelling of Active Traffic Behaviour	DUT	CEG	
Paul van Gent	The Human Factors (User Acceptance/Safety) Side of a Change Assistant System	DUT	CEG	
Xun Gong	Active Mode Research Based on Social Media Data	DUT	CEG	
Maria Alonso Gonzalez	Mobility Forecasting and Evaluation of Responsive Intelligent Public Transport Systems	DUT	CEG	
Maarten 't Hoen	Policy Implications of Travel Time Budgets	DUT	TPM	CE Delft

Bing Huang	The Next Frontier in Random Regret Minimization Modeling	DUT	TPM	CSC
Masoud Khakdaman	Integrated Synchromodal Transport System Analysis	DUT	TPM	
Anirudh Kishore Bhoopalam	Automated Driving in Freight Transport Truck Platooning	EUR	RSM	Verdus
Angela van der Kloof	Cycling, Gender and Transport Poverty	RUN	NSM	
Lizet Krabbenborg	Stakeholder Acceptability of Smart Pricing Measures	DUT	TPM	NWO
Xiaochen Ma	Pedestrian and Public Transport	DUT	CEG	CSC
Wenbin Ma	A Green Vertical Transport Plan of Deep Sea Mining Systems	DUT	3ME	CSC
Johan Los	Developing Efficient Methods for the Robust Management of Fleets of Cooperative (Automated) Vehicles	DUT	3ME	
Xiaojie Luan	Integrated Optimization in Equitable Train Scheduling from Planning to Operation	DUT	3ME	CSC
Ding Luo	Short-term Traffic Prediction	DUT	CEG	SETA project - EU
Tim van Oijen	Methodology Development for Crowd/Cyclist Management and Control	DUT	CEG	
Joydeep Paul	Consolidation of Transportation Flows in Multi-Channel Retail	EUR	RSM	
Baiba Pudane	Travel and Location Choice Behaviour of Prospective Automated Vehicle Users	DUT	TPM	
Ni Luh Putu Pratidinatri	Network Optimization and Regional Disparities: Archipelagic County	DUT	TPM	Nuffic managed by STC-BV
Florian Schneider	Establishing which Factors Determine the Route and Activity Choices for Active Mode Travelers in an Urban Environment based on Empirical Data	DUT	CEG	
Jishnu Narayan Sreekantan Nair	Demand Responsive Transport Systems in SCRIPTS project	DUT	CEG	
Danique Ton	Modelling Route Choice and Activity Scheduling for Active Modes	DUT	CEG	
Juan Pablo Núñez Velasco	Interactions of Automated driving and vulnerable Road Users, and Implications of Automated driving on Traffic Safety and Urban Design	DUT	CEG	NWO
Jord van der Vliet	Usage of Recorded Actual Travel Data for Long-term Demand Prediction	DUT	CEG	

Francesco Walker	Human Factors in Self-Driving Cars	UT	CTW	
Hobbs White	The Development of Multi-Level Capacity Control Mechanisms in Synchromodal Transport	EUR	RSM	
Marie-Jette Wierbos	Macroscopic Modelling of Active Mode Traffic	DUT	CEG	ERC Grant
Menno Yap	Measuring, Modelling and Improving Reliability and Robustness of Urban Public Transport in a Multi-Level Context: a passenger perspective	DUT	CEG	
Nadja Zeiske	Smart Incentives for Sustainable Travel Behaviour	RUG	GMW	
Bo Zhang	Driver Behavior in the Transition of Control between Manual and Automated Driving	UT	CTW	CSC
Yongqiu Zhu	Passenger Oriented Disruption Management in Railway	DUT	CEG	CSC
Boudewijn Zwaal	Using a network Approach on Modelling Traffic Flow: applying the model to cases in Amsterdam and Rotterdam	DUT	CEG	

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   Research highlights 2016

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 **Lorant A. Tavasszy** has been appointed as full professor "Freight Transport & Logistics" at Delft University of Technology. His research and education will focus on the analysis, modelling and forecasting of transport processes and transport flows over sea, inland water, rail, road and combinations thereof.

Staff member **Serge Hoogendoorn** of the Faculty of Civil Engineering and Geosciences (CEG) has been appointed Distinguished Professor at Delft University of Technology in the field of Smart Urban Mobility (SUM). Hoogendoorn is an internationally recognized expert on traffic flow and dynamic traffic management.

Staff member **Caspar Chorus** of the Faculty Technology, Policy & Management (TPM) earned a two million euro ERC grant for his modelling moral decision making proposal. The European Research Council has approved the ERC Consolidator proposal, a great achievement, since only about 10% of the submitted proposals is selected.

Furthermore, several TRAIL-researchers had successful proposals in the NWO Complexity grant: Complexity in Transport and Logistics. The purpose of the Complexity in Transport and Logistics programme is to encourage innovative, multidisciplinary research that will generate revolutionary ideas for logistics systems and contribute to new theories and innovation in the field of complex systems.
Two granted proposals had TRAIL-members as main applicant:

- *Universality and resilience in logistics networks: a mean field approach*
  (Caspar Chorus).

- *Trans-SONIC: Transport Self Organization through Network Integration and Collaboration*
  (Alexander Verbraeck)

The following granted proposals had TRAIL-members as co-applicant:

- *Complexity in high-tech manufacturing*
  (Jan Kwakkel and Alexander Verbraeck)

- *Complexity Methods for Predictive Synchromodality (Comet-PS)*
  (Rudy Negenboorn)

- *Improving the resilience of railway systems*
  (Rob Goverde)

- *SWARMPORT*
  (Lori Tavasszy and Ron van Duin)

3.3　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. As an example: in 2016 the document 'Research agenda: human behaviour and liveability, accessibility and safety' was published, aimed at stimulating research in this area. TRAIL scientific director Bert van Wee was one of the authors. The documents aims to provide a research agenda in the area of travel behaviour and its societal relevant implications.

4.   Knowledge Transfer

4.1   Ktrans highlights 2016

TRAIL PhD Congress 2016
On November 8 a very successful TRAIL Congress took place in Grand Hotel Karel V in Utrecht: 54 presentations were given, 85 PhD students and 15 staff members joint in and the atmosphere was very good. We all enjoyed it very much.

The congress was rated by an 8.6 by the participants (response rate: 50%) – which is very high for a congress. TRAIL is are 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 highly appreciated (rate 8.3), the workshop on the other hand was less evaluated (rate 6.4). Also the venue (location, food, rooms) was appreciated very much. A photo impression online.

TRAIL/IenM cooperation
As part of the collaboration between the Ministry of Infrastructure and the Environment and TRAIL, two meetings were organized in which policy relevant PhD theses were presented and discussed and three meetings were organized on specific, relevant topics in the TIL-domain:

11 April - Policy relevant TRAIL PhD theses
27 June - Workshop 'Transition to self-driving cars
16 October - Policy relevant TRAIL PhD theses
15 November - KIM Symposium
17 November - Workshop on parking

TRAIL/TUD DIMI IenM Summer school
TRAIL organised a Summerschool on sustainable futures for urban mobility from 22 – 26 August 2016 for policymakers within the Ministry of Infrastructure and the Environment. About 30 employees of the Ministry attended this Summer school. Within the first 3 days of this Summer school, several lectures and workshops were given on sustainable urban mobility systems and urban mobility governance. On day 4 the group visited several locations at metropole-region The Hague/Rotterdam; the last day was reserved for an assignment and presentations. You can read the report and photo's here.

TRAIL/TUD-IenM 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 2016 the following 7 Master classes were organized by TRAIL (all in Dutch):

- [Duurzaamheid aan de leiband: grote bedrijven en hun invloed](#)
  By dr. Magda Smink (voorheen UU, nu Stichting Natuur en Milieu) en dr. Erik Denters (VU)
- ICT maakt het verschil, Maatschappelijke verschillen en andere kanten van ICT in relatie tot (on)gelijkheid, mobiliteit en ruimte
  By prof. dr. Jan van Dijk (UTwente) en dr. Daniëlle Snellen (Planbureau voor de Leefomgeving)
- [Mens en machine – wat doet 't Rijk met de robot?](#)
  By dr. ir. Rinie van Est (Rathenau instituut) en dr. Jan Broersen filosoof en informaticus, en werkzaam als universitair hoofddocent aan de Universiteit Utrecht bij de opleiding Cognitieve Kunstmatige Intelligentie
- Een zee van ruimte en tijd? De (multi)functies van de Noordzee op de langere termijn
  By dr. Luc van Hoof (IMARES), coreferaat Lodewijk Abspoel
- [Kenniscocreatie – samen kennis maken](#)
  By Prof. dr. John Grin (Universiteit van Amsterdam) en dr. ir. Femke Merkx
- [Alles circulair – hoe werkt het, wat kan IenM en welke rol speelt logistiek?](#)
  By prof. dr. Ruud Balkenende (TUD) en prof. dr. ir. Rob van der Heijden (RUN)
- [Sturen van infrastructuren – de publieke waarde(n) van netwerken](#)
  By prof. dr. ir. Margot Weijnen (TUD) en dr. Aad Correljé (TUD) en dr. ir. Bert Sedowski (TUE)

4.2 Outlook

Important activities in 2017 on Knowledge Transfer will be:

- TRAIL Internal PhD Congress

- TRAIL IenM cooperation:

  - Relevance PhD Theses

  - Special Topics session

  - 2 presentations of TRAIL PhD theses and the relevance for policy makers

- TRAIL International Summerschool

- TRAIL IenM Masterclasses

- TRAIL IenM Summer school

5.   Concluding remarks

2016 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 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

Appendix 1: Overview of TRAIL Theses in 2016

Condition-Based Maintenance for Complex Systems: Coordinating maintenance and logistics planning for the process industries by Minou Olde Keizer.
Maintenance planning in the process industries is extremely complex. Failures should be prevented, but little time is available for performing preventive maintenance. Condition-Based Maintenance (CBM) offers a lot of potential, by basing the maintenance decisions on the actual system condition. This thesis investigates the optimal CBM policy structure for various complex systems, thereby focusing on decisions such as when to inspect, when to maintain, when to add an redundant component, and when to order spares.

Coordination of Waterborn AGVs by Huarong Zheng
Inside container terminals, conventional automated guided vehicles have been used extensively for decades to improve terminal operational efficiency and sustainability. For the transport between terminals, i.e., Inter Terminal Transport (ITT), this PhD thesis proposes a new type of container transporter, waterborne Autonomous Guided Vessels (waterborne AGVs). Advanced control and scheduling strategies have been developed for coordinating waterborne AGVs in four typical ITT scenarios to improve port logistics.

Capacity Drop on Freeways: Traffic dynamics, theory and Modeling by Kai Yuan.
One important traffic phenomenon is the capacity drop, which describes the fact that once congestion occurs, the queue discharge rate is generally substantially lower than the free-flow capacity. This dissertation characterizes more empirical features of the capacity drop, incorporates a speed-capacity relation into microscopic and macroscopic models, and reveals a significant behavioral mechanism behind the capacity drop phenomenon.

Coordinated Planning of Inland Vessels for Large Seaports by Shijie Li
This research aims to improve the reliability and efficiency of inland vessel transport in seaports. Methods that achieve this facilitate flexible planning of transport over water, so that this transport mode can be better integrated into the synchromodal transport chain. With the proposed methods, vessel operators can decide to what extent they would like to be coordinated, either partially-cooperative or fully-cooperative. Furthermore, via closed-loop re-scheduling the proposed methods can take into account disturbances and generate new and better rotations for vessel operators based on the up-to-date information.

The Influence of Herding on Departure Choice in Case of Evacuation: Design and analysis of a serious gaming experimental set-up by Mignon van den Berg
Increasing the ability to predict evacuation and travel choice behaviour during calamities or natural disasters can help to save many lives. Current disadvantages in existing data collection techniques require research to better understand that behaviour. This thesis deals with quantifying the effect of herding in evacuation choices using a serious gaming experimental set-up. The collected data has shown potential for better understanding and further research on evacuation choice behaviour.

Multi-Agent Control of urban Transportation Networks and of Hybrid Systems with Limited Information Sharing by Renshi Luo
This thesis aims at developing efficient methods for control of large-scale systems by employing state-of-the-art control methods and optimization techniques. This thesis is divided into two parts. In the first part, we address dynamic traffic routing for urban transportation networks. In the second part, we address multi-agent model predictive control of a class of hybrid systems with limiting information sharing and subject to global hard constraints.

Microscopic Modelling of Walking Behavior by Mario Campanella
How to model and simulate large pedestrian facilities accurately? This dissertation answers this question by analysing current pedestrian models and expanding one. The developed model (Nomad) describes pedestrians as individuals that minimise walking efforts. The model is expanded including behaviours that correspond to activities performed in pedestrian facilities such as train stations and airports. The model is calibrated and validated using a novel methodology that obtain parameters of general use.

Coordination in Hinterland Chains: An institutional analysis of port-related transport by Martijn van der Horst

Efficient hinterland connections are an important determinant of container port competition. However, establishing efficient coordination in port-related transport is challenging. The thesis increases the understanding of why coordination problems exist and how actors in hinterland chains improve coordination by applying different theoretical lenses. Different cases mainly from the port of Rotterdam are analysed by using inter-organisational theories in which Institutional Economics plays a central role.

Securing Safety: Resilience time as a hidden critical factor by Wim Beukenkamp
(published in the TRAIL Thesis Series, but was no TRAIL PhD student – thesis supervisors Hoogendoorn/Stoop)

Safety as such is not a major issue. Given safety its proper priority is what matters. It is the lack of knowledge about unknown risks and unexpected behaviour of a system following from its (hidden) properties that poses a challenge to adequate risk management. How to prepare yourself for the risks you don't know? This thesis shows the influence of the new notion of resilience time in high risk systems.

Articles on Parking Policy by Guiliano Mingardo
(published in the TRAIL Thesis Series, but was no TRAIL PhD student – thesis supervisor Van Wee)

This thesis deals with the policy aspect of parking and, accordingly, with mainly one specific actor in the parking sector, namely the local government. It makes explicit that parking is a very complex issue and that policy makers need to be better informed to deal with it effectively. Hopefully, this thesis will give them part of this knowledge. However, there is another actor in the parking sector that is in need of having and applying new knowledge on parking, and that is the parking industry, namely parking operators, suppliers of Parking Management Systems (PMS) and real estate investors.

Analysis and Modelling of Pedestrian Movement Dynamics at Large-scale Events by Dorine Duives

To what extent can we model the movements of pedestrians who walk across a large-scale event terrain? This dissertation answers this question by analysing the operational movement dynamics of pedestrians in crowds at several large music and sport events in the Netherlands and extracting the key crowd movement phenomena. A conceptual model and an assessment framework for pedestrian simulation models are developed specifically to describe and simulate this type of movement dynamics.

Contextual Factors of Sustainable Supply Chain Management Practices in the Oil and Gas Industry by Karimah Wan Ahmad

Current research on sustainable supply chain management (SSCM) practices in the oil and gas (O&G) industry is still fragmented. Specifically, there is a lack of understanding on the contextual factors within its business and organizational environments that could influence its adoption of the practices. This thesis proposes a multidimensional conceptual framework of SSCM for the O&G industry context and conducts several studies to address this knowledge gap, quantitatively and qualitatively.

Prediction of Belt Conveyor Idler Performance by Xiangwei Liu

This thesis focuses on how to improve the reliability of belt conveyor systems with respect to idler performance. The goal is to improve the predictability of idler roll failures. Theoretical and experimental research is carried out to determine the load on a loaded conveyor belt and idler rolls. Experimental study is conducted to investigate how to detect idler roll failures. A decision making framework for idler maintenance is also proposed.

Stochastic Models for Order Picking Systems by Jelmer van der Gaast

Order picking, the process of retrieving customer orders from their storage locations, is the most critical operation in a warehouse. Any under performance in order picking can lead to unsatisfactory service and high operational cost for the warehouse, and consequently for the whole supply chain in which the company operates. This thesis develops new stochastic models for the performance evaluation of two state-of-the art order picking systems: zone picking and polling-based milkrun picking. These models adequately describe and predict the consequences of variability on the performance of these warehousing systems.

Practice Oriented Algorithmic Disruption Management in Passenger Railways by Joris Wagenaar
How to deal with a disruption is a question railway companies face on a daily basis. This thesis focusses on the subject how to handle a disruption such that the passenger service is upheld as much as possible. The current mathematical models for disruption management cannot yet be applied in practice, because several important practical considerations are not taken into account. In this thesis several models are presented which take important practical details into account: (1) creating a macroscopic global feasible solution for all three resource schedules, instead of focussing on one individual resource schedule. (2) Scheduled maintenance appointments required by certain rolling stock units are included while rescheduling. (3) Dead-heading trips to transfer rolling stock units from stations with a surplus of inventory to stations with a shortage of inventory. (4) Adjusted passenger demand, the passenger demand is not static, but depends on the capacity appointed to the previous trips. Finally, (5) checking whether a rolling stock circulation is feasible with respect to the available depot tracks (the shunting yard) within a station. We make use of different techniques to solve the models, for instance, mixed integer linear programming, column generation, constraint programming, and heuristic models are used in this thesis. The results demonstrate that these five practical considerations can be taken into account in the disruption management models.

A Bounded Rationality Model of Short and Long-Term Dynamics of Activity-Travel Behavior by Ifigeneia Psara
The current generation of activity-based models relies on cross-sectional data and therefore are static in nature. However, as the environment is non-stationary, habitual activity-travel patterns may become unsatisfactory, triggering short or even long-term changes. A dynamic agent-based activity-travel behavior model was developed in this PhD research project. This agent-based model can predict the formation of habitual behavior, as well as the emergence of short and long-term dynamics. Moreover, it is a bounded-rationality model since learning and forgetting processes, cognitive and emotional responses and tolerance to stress are taken into account. Numerical simulations were conducted to calibrate and test the face validity of the model. Finally, a stated adaptation experiment was designed in order to collect empirical data and validate the underlying assumptions of models. Results support he validity and potential of the approach.

The Use of Advanced Transportation Monitoring Data for Official Statistics by Yingyi Ma
Traffic and transportation statistics are mainly published as aggregated information, and are traditionally based on surveys or secondary data sources, like public registers and companies' administrations.
Nowadays, advanced monitoring systems are installed in the road network, offering more abundant and detailed transport information than surveys and secondary data sources. Usually, these rich data are applied in the field of transportation planning research. But they also seem promising to national statistics offices to update their databases and apply new methods to generate statistics. Transportation demand estimation and forecasting traffic volumes are taken as examples.
Quantitative information on transportation demand is important for national and regional policy makers who want to know the number of freight vehicles traveling from origins to destinations. Traditionally, they largely extract this information from the national statistics offices. Transportation research needs the demand data to understand transportation behaviour in the road network, such as congestion and pollution. In the thesis, information methods and hierarchal Bayesian networks are used to demonstrate the approaches to estimate transportation demand. To forecast transportation demand, the hierarchal Bayesian network associated with the multi-process model is applied.

Coordinated Model Predictive Control of Synchromodal Freight Transport Systems by Le Li
Hinterland accessibility has become a crucial port selection criterion for international shipping lines, and is also one of the most influential factors of seaport competition. Synchromodality is a newly developed and innovative way of organizing hinterland haulage. This thesis proposes new network models and distributed model predictive control approaches for container flow control in synchromodal freight transport planning and coordination problems.

Road Pricing Policy Implementation by Diana Vonk Noordegraaf
Road pricing – policies that impose direct charges on road use – is a potentially effective measure to reduce (the negative effects of) road transport. However, road pricing policy implementation is often challenging. This thesis increases the understanding of which implementation factors can play a role in road pricing policy implementation and in what way. The analyses of real-world cases, such as kilometre charging and Peak Hour Avoidance in the Netherlands, are the core of this thesis.

Modeling, Robust and Distributed Model Predictive Control for Freeway Networks by Shuai Liu
This thesis aims at improving the effectiveness of model predictive control for large-scale freeway networks. We first improve the prediction models for model predictive control by extending multi-class macroscopic traffic flow and emission models for freeway networks. Next, we focus on scenariobased model predictive control for handling uncertainties. Finally, in order to control large-scale freeway networks with uncertainties, we develop a scenario-based distributed model predictive control approach.

Stochastic Macroscopic Analysis and Modelling for Traffic Management by Simeon Calvert
Traffic management is an effective alternative to road construction or pricing. However, the effects are highly affected by stochastic uncertainty and fluctuations in traffic. This is demonstrated in this thesis. The thesis furthermore proposes methods for the analysis and modelling of the effects of such stochastic aspects for the evaluation of traffic management measures. These consider day-to-day uncertainty as well as inter vehicle dynamics. Furthermore, consideration is given to methods to present and visualise the results from stochastic traffic models.

Reliable Timetable Design for Railways and Connecting Public Transport Services by Daniel Sparing
Railways and public transport form an essential part of our transport systems: together with walking and cycling, they are the space-efficient and environmentally friendly alternatives to private cars. However, new infrastructure is costly and therefore there is a strong need that the existing network is used in an optimal manner. All research topics in this thesis therefore focus on improving railway and public transport timetabling.

Uncertainty in Modeling Activity-Travel Demand in Complex Urban Systems by Soura Rasouli
Models of travel demand forecasting are commonly used in urban and transportation planning practice to predict the demand for infrastructure and urban facilities and assess the likely effects of new projects and urban-transportation policies on household activity-travel patterns and a series of derived performance indicators, such as total kilometers travelled, trip-tour ratios, emissions, energy consumption and transportation mode shares. Common applications involve the use of single model run outcomes and associated performance indicators, assuming that both the input data and the model are valid.

Traffic Flow at Sags: Theory, Modeling and Control by Bernat Goñi-Ros
Sag vertical curves (sags) are a common type of bottleneck in freeway networks. This thesis investigates the causes of congestion at sags and presents a new approach to model traffic on hilly freeways. Also, it presents new traffic management strategies to mitigate congestion at sags. Specifically, the thesis determines the optimal behavior of connected vehicles at sags and proves the potential of traffic flow control measures using variable speed limits.

Behavioral Operations in Logistics by Jelle de Vries
People play an essential role in almost all logistical processes, and have a substantial influence on logistical outcomes. However, in their actions and decisions people do not always behave perfectly rational. This can be problematic, especially as most processes and models do not take this potential irrationality into account. As a consequence, theoretical models are often less accurate than they could be and companies might be confronted with suboptimal outcomes. The field of behavioral operations aims to address this issue by departing from the assumption that all agents participating in operating systems or processes are fully rational in not only their decisions, but also in their actions. This dissertation focuses on addressing the latter aspect by investigating which behavioral factors and individual characteristics of people influence different outcomes in (intra)logistics, and to what extent. In five separate studies, we consider not only productivity as outcome measure, but also safety and productivity. More specifically, we study the relation between these outcomes and behavioral factors such as regulatory focus, personality, safety-specific transformational leadership, and incentive systems. The results provide a strong illustration of the potential impact of behavioral factors in the (intra)logistical context, and can help managers to increase safety and productivity in their organizations.

Effects of Pricing Strategies on Dynamic Repertoires of Activity-Travel Behaviour by Elaheh Khademi
As an alternative to the current state of the art in travel behavioral research, the ultimate goal of this thesis is to consider a new approach to study the impact of external policies on changes in current activity-travel patterns. The proposed approach in this thesis differs from existing approaches in the following ways. First, the focus is on complete activity repertoires of individuals. Secondly, the focus of attention is on the overall utility of an activity. Thirdly, it is assumed that individuals' adaptation may be sub-optimal. Finally, the focus is on behavioral changes under influence of a multitude of policies.

Appendix 2: TRAIL Staff Members on 31-12-2016

Name		University
Dr.	Jan Anne Annema	Technische Universiteit Delft-Fac. Techniek, Bestuur en Management
Prof. dr. ir.	Bart van Arem	Technische Universiteit Delft-Fac. Civiele Techniek en Geowetenschappen
Prof. dr. ir.	Eric van Berkum	Universiteit Twente - Faculteit Construerende Technische Wetenschappen
Dr. ir.	Ton van den Boom	TU Delft- Fac. Werktuigbouwkunde, Maritieme Techniek & Technische Materiaalwetenschappen
Prof. dr.	Karel Brookhuis	Rijksuniversiteit Groningen - Faculteit der Gedrags- en Maatschappijwetenschappen
Prof. dr. ir.	Caspar Chorus	Technische Universiteit Delft-Fac. Techniek, Bestuur en Management
Dr. ir.	Francesco Corman	TU Delft- Fac. Werktuigbouwkunde, Maritieme Techniek & Technische Materiaalwetenschappen
Dr. ir.	Goncalo Correia	Technische Universiteit Delft-Fac. Civiele Techniek en Geowetenschappen
Prof.	Ricky Curran	Technische Universiteit Delft - Faculteit der Luchtvaart- en Ruimtevaarttechniek
Dr. ir.	Winnie Daamen	Technische Universiteit Delft-Fac. Civiele Techniek en Geowetenschappen
Prof. dr. ir.	Bart De Schutter	TU Delft- Fac. Werktuigbouwkunde, Maritieme Techniek & Technische Materiaalwetenschappen
Prof. dr. ir.	Rommert Dekker	Erasmus Universiteit Rotterdam - Faculteit der Economische Wetenschappen
Dr.	Haneen Farah	Technische Universiteit Delft-Fac. Civiele Techniek en Geowetenschappen
Dr.	Marina van Geenhuizen	Technische Universiteit Delft-Fac. Techniek, Bestuur en Management
Prof. dr.	Harry Geerlings	Erasmus Universiteit Rotterdam - Faculteit der Sociale Wetenschappen
Prof. dr. ir.	Karst Geurs	Universiteit Twente - Faculteit Construerende Technische Wetenschappen
Dr.	Rob Goverde	Technische Universiteit Delft-Fac. Civiele Techniek en Geowetenschappen
Prof. dr.	John Groenewegen	Technische Universiteit Delft-Fac. Techniek, Bestuur en Management
Prof. dr.	Marjan Hagenzieker	Technische Universiteit Delft-Fac. Civiele Techniek en Geowetenschappen
Dr. ir.	Andreas Hegyi	Technische Universiteit Delft-Fac. Civiele Techniek en Geowetenschappen
Prof. dr. ir.	Rob van der Heijden	Radboud Universiteit Nijmegen - Faculteit der Managementwetenschappen
Prof. dr. ir.	Hans Hellendoorn	TU Delft- Fac. Werktuigbouwkunde, Maritieme Techniek & Technische Materiaalwetenschappen
Prof. dr. ir.	Serge Hoogendoorn	Technische Universiteit Delft-Fac. Civiele Techniek en Geowetenschappen
Dr.	Milan Janic	Technische Universiteit Delft-Fac. Civiele Techniek en Geowetenschappen
Dr.	Victor Knoop	Technische Universiteit Delft-Fac. Civiele Techniek en Geowetenschappen
Prof. dr.	René de Koster	Erasmus Universiteit Rotterdam -RSM
Dr. ir.	Fernando Kuipers	Technische Universiteit Delft - Faculteit Electrotechniek, Wiskunde & Informatica

Dr. ir.	Jan Kwakkel	Technische Universiteit Delft-Fac. Techniek, Bestuur en Management
Prof. ir.	Han Ligteringen	Technische Universiteit Delft-Fac. Civiele Techniek en Geowetenschappen
Prof. dr. ir.	Hans van Lint	Technische Universiteit Delft-Fac. Civiele Techniek en Geowetenschappen
Prof. dr. ir.	Vincent Marchau	TRAIL Research School
Dr.	Karel Martens	Radboud Universiteit Nijmegen - Faculteit der Managementwetenschappen
Prof. dr.	Marieke Martens	Universiteit Twente - Faculteit Construerende Technische Wetenschappen
Prof.dr.	Henk Meurs	Radboud Universiteit Nijmegen - Faculteit der Managementwetenschappen
Dr.	Eric Molin	Technische Universiteit Delft-Fac. Techniek, Bestuur en Management
Dr.	Rudy Negenborn	TU Delft- Fac. Werktuigbouwkunde, Maritieme Techniek & Technische Materiaalwetenschappen
Dr. ir.	Rob van Nes	Technische Universiteit Delft-Fac. Civiele Techniek en Geowetenschappen
Dr.	Soora Rasouli	Technische Universiteit Eindhoven
Dr.	Jan Riezebos	Rijksuniversiteit Groningen-Fac. Economie en Bedrijfskunde
Prof. dr.	Kees Jan Roodbergen	Rijksuniversiteit Groningen-Fac. Economie en Bedrijfskunde
Dr. ir.	Dingena Schott	TU Delft- Fac. Werktuigbouwkunde, Maritieme Techniek & Technische Materiaalwetenschappen
Prof. dr. ir.	Lori Tavasszy	Technische Universiteit Delft-Fac. Techniek, Bestuur en Management
Prof. dr.	Ruud Teunter	Rijksuniversiteit Groningen-Fac. Economie en Bedrijfskunde
Prof. dr.	Harry Timmermans	Technische Universiteit Eindhoven
Dr. ir.	Han Veeke	TU Delft- Fac. Werktuigbouwkunde, Maritieme Techniek & Technische Materiaalwetenschappen
Dr.	Wijnand Veeneman	Technische Universiteit Delft-Fac. Techniek, Bestuur en Management
Dr.	Jasper Veldman	Rijksuniversiteit Groningen-Fac. Economie en Bedrijfskunde
Prof. dr. ir.	Alexander Verbraeck	Technische Universiteit Delft-Fac. Techniek, Bestuur en Management
Prof. dr.	Iris Vis	Rijksuniversiteit Groningen-Fac. Economie en Bedrijfskunde
Dr.	Meng Wang	Technische Universiteit Delft-Fac. Civiele Techniek en Geowetenschappen
Prof. dr.	Bert van Wee	Technische Universiteit Delft-Fac. Techniek, Bestuur en Management
Dr.	Mathijs de Weerdt	Technische Universiteit Delft - Faculteit Electrotechniek, Wiskunde & Informatica
Prof. ir.	Fred Wegman	Technische Universiteit Delft-Fac. Civiele Techniek en Geowetenschappen
Dr.	Bart Wiegmans	Technische Universiteit Delft-Fac. Civiele Techniek en Geowetenschappen
Prof. dr.	Cees Witteveen	Technische Universiteit Delft - Faculteit Electrotechniek, Wiskunde & Informatica
Prof. dr. ir.	Hans Wortmann	Rijksuniversiteit Groningen - Faculteit Bedrijfskunde
Dr.	Stuart, Xiang Zhu	Rijksuniversiteit Groningen-Fac. Economie en Bedrijfskunde
Prof. dr.	Rob Zuidwijk	Erasmus Universiteit Rotterdam -RSM

Appendix 3: Overview of TRAIL PhD projects on 31-12-2016

A. Transport & Mobility			
Program leaders: Chorus, Meurs, Timmermans			
Synthesis of machine Learning and choice Modeling	Ahmad	Alwosheel	TUD
Urban Transport, Accessibility, Social Exclusion and Governance in Metroploitan Areas in Indonesia	Ayu	Andani	UT
Sustainable Airline Industry and Consumer Behaviour and Preferences	Yashar	Araghi	TUD
Interface Design for Transitions between Manual and Automated Driving	Anika	Boelhouwer	UT
Activity Based Model of Travel Demand	Valeria	Caiati	TUE
Activity-Based Travel Demand Modeling under Uncertainty	Eleni	Charoniti	TUE
The Impact of Time on the Relationship between Travel Behaviour and the Built Environment	Paul	Coevering, van de	TUD
The Relationship between Road Safety, Infrastructure and Driving Behaviour on 80 km/h Roads	Kirsten	Duivenvoorden	TUD
Governance of Smart City Public Transport	Shima	Ebrahimigharehbaghi	RUN
SCRIPTS: A New Generation of Activity-based Models of Travel Demand	Anna-Maria	Feneri	TUE
An Asset Management Approach for Railway Systems	Randy	Fischer	TUD
Analysis of Transportation Mode Between central City and New Towns using Activity-Based Approach	Jia	Guo	TUE
Policy Implications of Travel Time Budgets	Maarten	Hoen, 't	TUD
The Next Frontier in Random Regret Minimization Modeling	Bing	Huang	TUD
Housing Mobility in Historical Blocks in China	Wen	Jiang	TUE
Interaction between Urbanization, Infrastructure Development and Public Transport Use: a long-term analysis	Dena	Kasraian Moghaddam	TUD
Matching Public Transport Networks to Land-Use Patterns in Medium-Sized Metropolitan Regions	Kasper	Kerkman	RUN
Automated Driving in Freight Transport Truck Platooning	Anirudh	Kishore Bhoopalam	EUR
Cycling, Gender and Transport Poverty	Angela	Kloof, van der	RUN
Uncertainty and Cost-Effectiveness of Policy Measures to Reduce CO2 Emissions from Transport	Robert	Kok	TUD
Shared Situational Awareness in Complex Logistic Supply Chains	Shalini	Kurapati	TUD
Governance of Networks of Transport and Land-use	Sara	Levy	RUN
Consumer Preferences for Electric Vehicles	Fanchao	Liao	TUD
Infrastructure Service network Design for Automated Vehicles	Bahman	Madadi	TUD
Travel and Location Choice Behaviour of Prospective Automated Vehicle Users	Baiba	Pudane	TUD
Agent-Based Parking Modelling	Geert	Tasseron	RUN
Advanced Monitoring of Intelligent Rail Infrastructure	Kim	Verbert	TUD
A New Approach to Transport Modelling by Using Ubiquitous Data: the activity-space model	Wang	Yihong	TUD
Smart Incentives for Sustainable Travel Behaviour	Nadja	Zeiske	RUG

B. Infrastructure & Traffic Management			
Program leaders: Hoogendoorn, Van Berkum			
Mobility Forecasting and Evaluation of Responsive Intelligent Public Transport Systems	Maria	Alonso Gonzalez	TUD
Turbulent Traffic - The Impact of Traffic Turbulence on Safety and Operations	Aries	Beinum, van	TUD
Development of a Methodology to Assess Ports and Waterways on Capacity and Safety	Xavier	Bellsolà Olba	TUD
Robust and Resilient Railway Timetables	Nikola	Besinovic	TUD
STAQ: Static Traffic Assignment with Queuing	Luuk	Brederode	TUD
Autonomous Control for Cooperative Multi-Vessel System	Linying	Chen	TUD
Scenario-based Multi-objective Automated Driving Strategies fro Safe and Efficient Traffic	Na	Chen	TUD
Dynamic Assessment of Multi-modal Transport Systems	Gijs	Eck, van	TUD
Potential of Increasing Road Vehicle Automation for Traffic Management Application	Paul	Erp, van	TUD
Traffic Informtion as a Tool to Bridge the Gap between User Optimum and System Optimum	Mariska	Essen, van	UT
Planning and Design Guidelines of Pedestrian and Cyclist in Cities	Ilse	Galama	TUD
Theory and Microscopic Modelling of Active Traffic Behaviour	Alexandra	Gavriilidou	TUD
The Human Factors (User Acceptance/Safety) Side of a Change Assistant System	Paul	Gent, van	TUD
Railway Microscopic Simulation Framework for S&G Study	Nadjla	Ghaemi	TUD
Active Mode Research Based on Social Media Data	Xun	Gong	TUD
Optimal Multimodal Network Management for Urban Emergencies	Jeroen	Gun, van der	TUD
Network-wide Model-Based Traffic Control for Roadwork on Freeways	Yu	Han	TUD
Designing and Managing the Transfer Function of Train Stations	Jeroen	Heuvel, van den	TUD
EMPOWER People to Reduce Car Traffic	Bingyuan	Huang	UT
Mulit-Level Predictive Traffic control for Large -Scale Urban Networks	Anahita	Jamshidnejad	TUD
Travel Behaviour and Traffic Operations in Case of Exceptional Events	Mahtab	Joueiai	TUD
Crowd Behaviour under Exceptional Conditions	Erica	Kinkel	TUD
Naturalistic Driving Observation to Study Navigation Support Safety and Efficiency	Allert	Knapper	TUD
Stakeholder Acceptability of Smart Pricing Measures	Lizet	Krabbenborg	TUD
Automtic Multiscale Graph Generation from Geographical Data	Panchamy	Krishnakumari	TUD
Design of Network Wide Traffic Management System	Ramon	Landman	TUD
Airline/ATM Network Performance and Optimization	Yalin	Li	TUD

Demand Forecasting and Operational Strategies for Automated Taxis	Xiao	Liang	TUD
Setting Criteria for Safe Driving Behaviour on the Road	Roald	Loon, van	UT
Short-term Traffic Prediction	Ding	Luo	TUD
Pedestrian and Public Transport	Xiaochen	Ma	TUD
Connected Driver Assitance and Traffic Management	Niharika	Mahajan	TUD
Impacts of Automated Driving on Traffic Flow	Freddy	Mullakkal Babu	TUD
Interactions of Automated driving and vulnerable Road Users, and Implications od Automated driving on Traffic Safety and Urban Design	Juan Pablo	Núñez Velasco	TUD
Methodology Development for Crowd/Cyclist Management and Control	Tim	Oijen, van	TUD
Dynamics in Mode Choice Behavior	Marie-José	Olde Kalter	UT
Line Plan Evaluation and Timetabling	Gert-Jaap	Polinder	EUR
Energy-Efficient Timetable Design	Gerben	Scheepmaker	TUD
Establishing which Factors Determine the Route and Activity Choices for Active Mode Travelers in an Urban Environment based on Empirical Data	Florian	Schneider	TUD
Maritime Traffic Model for Increased Safety and Capacity of Ports and Waterways	Yaqing	Shu	TUD
Transport Pricing: a Multi-Modal Dynamic Network Perspective	Erik-Sander	Smits	TUD
Demand Responsive Transport Systems in SCRIPTS project	Jishnu Narayan	Sreekantan Nair	TUD
Multi-Agent Game Theoretic Approaches for Service Contracting in Railway Operations	Zhou	Su	TUD
A Multimodal Multi-Scale Traffic Model	Guus	Tamminga	TUD
Modelling Route Choice and Activity Scheduling for Active Modes	Danique	Ton	TUD
Human Factors of Automated Driving: predicting real-world effects of automated driving	Silvia	Varotto	TUD
Usage of Recorded Actual Travel Data for Long-term Demand Prediction	Jord	Vliet, van der	TUD
Human Factors in Self-Driving Cars	Francesco	Walker	UT
Modeling and Development of Energy-efficient Train Driver Advisory Systems	Pengling	Wang	TUD
Robust, Optimal, Predictive, and Integrated Urban Traffic Control	Goof	Weg, van de	TUD
Macroscopic Modelling of Active Mode Traffic	Marie-Jette	Wierbos	TUD
Urban Parking Management in the times of Shared (Automated) Mobility	Konstanze	Winter	TUD
Using Cooperative ACC to form High-performance Vehicle Streams	Lin	Xiao	TUD
The Design of High-Speed Railway Passenger Service Plans from a Multimodal Transport Perspective	Fei	Yan	TUD
Lane-Specific Traffic Control	Shengyue	Yao	TUD

Measuring, Modelling and Improving Reliability and Robustness of Urban Public Transport in a Multi-Level Context: a passenger perspective	Menno	Yap	TUD
Driver Behavior in the Transition of Control between Manual and Automated Driving	Bo	Zhang	UT
Nautical Traffic Modelling for Safe and Efficient Ports	Yang	Zhou	TUD
Passenger Oriented Disruption Management in Railway	Yongqiu	Zhu	TUD
Theory and Modelling of Acquiring, Processing and Storing Spatial Knowledge	Lara-Britt	Zomer	TUD
Using a network Approach on Modelling Traffic Flow: applying the model to cases in Amsterdam and Rotterdam	Boudewijn	Zwaal	TUD

C. Logistics and Transport Organisation			
Program leaders: De Koster, Tavasszy, Vis			
Intelligent Monitoring of Railway Equipment	Alireza	Alemi	TUD
Analysis of Autonomous Vehicle Storage and Retrieval Systems (AVSRS)	Kaveh	Azadeh	EUR
Revenue Management and complexity in Public Transport	Paul	Bouman	EUR
Residual Ultimate Strength of Damaged Metallic Pipelines	Jie	Cai	TUD
Effective Use of Reefer Containers through the Port of Rotterdam: a transitions oriented approach	Bob	Castelein	EUR
Wear Reduction of Transportation Equipment Using Bionic Design and Discrete Element Method	Guangming	Chen	TUD
Multi-channel Inventory Control	Arjan	Dijkstra	RUG
Information Integration for Intelligent Control of Logistics and Transport Systems	Fan	Feng	TUD
Modeling Global-Freight Logistics System	Ronald	Halim	TUD
Modelling and Optimization on Local Traffic Networks	Yu	Hu	TUD
Study and Optimization of the Interface between Railway Network, Container Ports/Mainports and Freight Bundling Facilities	Qu	Hu	TUD
Maintenance Planning and Maintenanc Optimization	Bram	Jonge, de	RUG
Integrated Synchromodal Transport System Analysis	Masoud	Khakdaman	TUD
Green Port Initiatives and Environmental Fleet Investment	Xishu	Li	EUR
Integration and Modernization of Transportation Systems	Xiao	Lin	TUD
Incentives for Renewable Energy	Jose Alejandro	Lopez	RUG
Developing Efficient Methods for the Robust Management of Fleets of Cooperative (Automated) Vehicles	Johan	Los	TUD
Integrated Optimization in Equitable Train Scheduling from Planning to Operation	Xiaojie	Luan	TUD
A Green Vertical Transport Plan of Deep Sea Mining Systems	Wenbin	Ma	TUD

Design and Control of Autonomous Vehicle Storage and Retrieval Systems	Masoud	Mirzaei	EUR
Decision Making on Distribution Structures and Distribution Centre Locations	Sander	Onstein	TUD
Consolidation of Transportation Flows in Multi-Channel Retail	Joydeep	Paul	EUR
Assessing the gain of Sharing Demand Forecast in FMCG Supply Chains	Clint	Pennings	EUR
Sustainable Logistics in Fresh Food (SLIFF)	Roel	Post	RUG
Network Optimization and Regional Disparities: Archipelagic County	Ni Luh Putu	Pratidinatri	TUD
Simultaneous Management of Transfers on Railway Networks for Passengers and Freight Flows	Wenhua	Qu	TUD
Hinterland Network Transportation of Containers	Bart	Riessen, van	EUR
Sustainable Logistics in Fresh Food	Arpan	Rijal	EUR
Evaluating Intermodal Freight Transport & Logistics Markets	Hamid	Saeedi	TUD
Dynamic Contracting in Infrastructures	Joris	Scharpff	TUD
Performance Interaction Model	Alf	Smolders	TUD
Vehicle Routing Methods for Parcel Delivery	Marjolein	Veenstra	RUG
The Development of Multi-Level Capacity Control Mechanisms in Synchromodal Transport	Hobbs	White	EUR
The Design, Planning and Execution of Sustainable Container Transport networks: information as an enabler	Panagiotis	Ypsilantis	EUR
Optimal Design of Pipe Conveyor	Maria	Zamiralova	TUD
Multi-Level Control of Large-Scale Logistic Systems	Yashar	Zeinaly	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