



Ruhr Master School
of Applied Sciences

RMS SUMMER SCHOOL 2022

#07





Interdisciplinary visions for the mobility of the future.

Come on in: the RMS Summer School from 15th to 26th August 2022 was finally back to being hosted in attendance after a Covid19-related break. This year's theme "Regional Sustainability: Smart Mobility" attracted 45 students from 15 countries to the Gelsenkirchen campus of Westfälische Hochschule.

They all brought their knowledge from very different fields of study to address some significant questions of future mobility from different perspectives: how can mobility and mobility systems be steered towards sustainable paths? What infrastructure must be provided, e.g. with regards to cycling, charging or sharing? How can technological innovations or a different organization of mobility contribute to sustainability? International participants started four days early with an accompanying programme in order to get to know region and culture in Ruhr Metropolis, to connect with each other and to meet their supporting buddies from the local RMS universities.

RMS Summer School is a joint offer of the RMS universities of applied sciences Fachhochschule Dortmund (FH DO), Hochschule Bochum (HS BO) and Westfälische Hochschule (WH). The event aims to enable an intensive international and interdisciplinary exchange on a relevant topic of sustainability between experts and students from around the globe. In 2022, Hochschulallianz Ruhr (HAR) and InduTwin (a project of FH DO) were involved as well. The event was supported by Stiftung Mercator and by the German Academic Exchange Service (DAAD) with funds from the Federal Foreign Office.

SCHEDULE

DAY	ACCOMPANYING PROGRAMME
Monday, 15/08/2022	<ul style="list-style-type: none"> Welcome & Get-Together Buddy Time Barbecue Evening
Tuesday, 16/08/2022	<ul style="list-style-type: none"> German Basic Knowledge with Janine Sroka Guided Tour: Gelsenkirchen City Sports Night
Wednesday, 17/08/2022	<ul style="list-style-type: none"> German Basic Knowledge with Janine Sroka Guided Tour: Bochum Westpark Buddy Time
Thursday, 18/08/2022	<ul style="list-style-type: none"> German Basic Knowledge with Janine Sroka Guided Tour: Signal Iduna Park (stadium of BVB 09) Game Night
DAY	PROFESSIONAL PROGRAMME
Friday, 19/08/2022	<ul style="list-style-type: none"> Introductory Talk: Transforming mobility – regional approaches to a global challenge with Dr.-Ing. Björn Schäfer (ZF Group, FH Dortmund) Cross-Cultural Connection Workshop Kick-Off Group Work
Monday, 22/08/2022	<ul style="list-style-type: none"> Impulse Talk: Institute for Electro Mobility with Prof. Dr. Haydar Mecit (HS BO) Impulse Talk: Energy management in metropolitan emobility charging infrastructures EMEL with Prof. Dr.-Ing. Aron Teermann (WH) Impulse Talk: Cycling infrastructure in metropolitan areas with Prof. Dr.-Ing. Iris Mühlenbruch (HS BO) Excursion: Hydrogen as a fuel for the mobility of the future
Tuesday, 23/08/2022	<ul style="list-style-type: none"> Impulse Talk: Sensing, interacting and sharing: Rethinking how to get around with Prof. Dr. Andreas Becker (FH DO) Impulse Talk: Urban logistics – freshly thoughts of goods transport for major cities with Christian Kühnhold (Smart City Loop GmbH) Impulse Talk: ANTRIC ONE - A cargo bike for city logistics and last mile delivery with Eric Diederich (ANTRIC GmbH) Master and Bachelor Workshops
Wednesday, 24/08/2022	<ul style="list-style-type: none"> Impulse Talk: The role of machine learning for highly automated vehicles with Dipl.-Ing. Mirko Meuter (Aptiv Services GmbH) Impulse Talk: SHAREuregio and SkyCab: Sustainable mobility concepts for today and tomorrow with Elisabeth Köppen and Torsten Merken (FH Aachen, European Center for Sustainable Mobility) Excursion: Hydrogen as a fuel for the mobility of the future
Thursday, 25/08/2022	<ul style="list-style-type: none"> Impulse Talk: Circular Economy for Lithium Ion batteries, ideas and barriers with Prof. Dr.-Ing. Ralf Holzhauer (WH) Impulse Talk: Changing models of urban development with regard to mobility in the Ruhr Metropolis with Prof. Dipl.-Ing. Andreas Fritzen (HS BO) Panel Discussion: „Smart Mobility - the key to sustainable mobility of the future?“
Friday, 26/08/2022	<ul style="list-style-type: none"> Gallery Walk & Best Poster Award Digital Networking Event in cooperation with the Summer School on Green Business and Sustainability Network Farewell



MONDAY, 15/08/2022

Getting to know everyone.

RMS Summer School began with a warm welcome of both international participants and local buddies by Prof. Dr. iur. André Latour (Vice President for Sustainability and International Affairs at WH) and Prof. Dr. Timm Braasch (RMS Director at WH). The RMS team gave an introduction to the event and provided helpful information for the guests as well as an overview on the accompanying programme of the first four days.

During a casual get-together and barbecue evening, the international participants then met their buddies: students from the local RMS universities who volunteered to support the international guests during the whole event and their stay in Germany. As everyone had prepared a short profile with information on both their student and private life in advance, conversations did not have a chance to run dry.



Welcome session at Westfälische Hochschule



Get-together with the buddies



TUESDAY, 16/08/2022 TO THURSDAY, 18/08/2022

Getting to know language, region and culture.

The next three days each started with a German Course by Janine Sroka. In her morning sessions from Tuesday to Thursday, Janine introduced the international participants to some basic German knowledge, covering casual small talk as well as vocabulary for every day life.

The afternoons were dedicated to sightseeing:

- On **Tuesday afternoon**, the group attended a tour of Gelsenkirchen Schalke. Tour guide Olivier Kruschinski covered both the historic „Kampfbahn“ stadium and the historic transformation of the city center.
- **Wednesday afternoon** offered a tour to Bochum West-

park and Jahrhunderthalle to show students how the coal and steel industry have shaped Ruhr Metropolis and how the former areas of heavy industry are used today.

- On **Thursday afternoon**, tour guide Timo Hiepler led the group through Signal Iduna Park, offering some first-hand insight and answering various questions on soccer in the Ruhr Area in general and BVB 09 in particular.

Each day finished with some joint leisure time in the evening, for which the buddies and the RMS team had organized game nights or sport sessions.



The group at the Südtribüne of Signal Iduna Park, the stadium of soccer club Borussia Dortmund



Visit at Westpark and Jahrhunderthalle Bochum



Guided tour at Westpark and Jahrhunderthalle Bochum



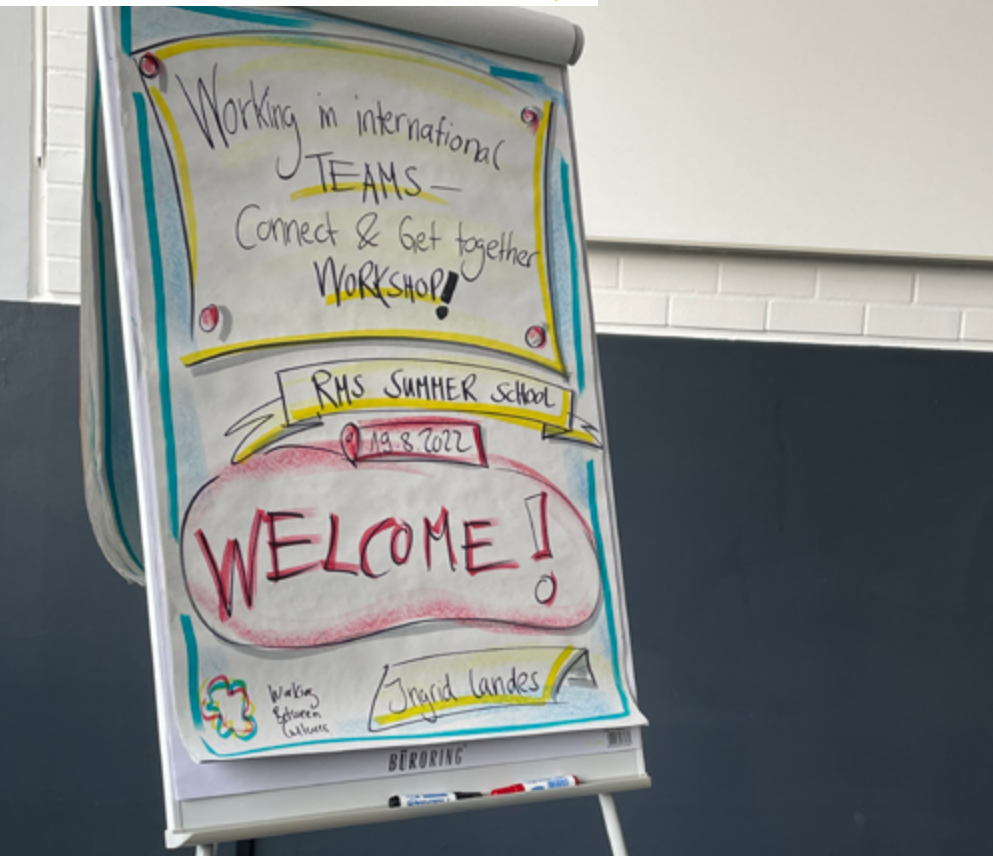
Guided tour „Myth of Schalke“: St. Joseph church



Guided tour at Signal Iduna Park



Summer School press area :-)



FRIDAY, 19/08/2022

Comminucating and collaborating across cultures.

A full auditorium, different languages, exuberant laughter: when the local participants joined the international group on Friday, RMS Summer School was finally back to its „old self“ again.

After a brief official welcome by Prof. Dr. Timm Braasch (RMS director at WH) and the RMS team, the professional programme kicked off with an introductory talk by Dr.-Ing. Björn Schäfer (ZF Group, FH Dortmund). Emphasizing the importance of regional approaches in order to tackle the global challenge of transforming mobility in a sustainable way, he narrowed his gaze from a global to a European and from a national to an even local perspective, breaking down regulatory conditions and treaties to actual measures for cities and local communities.

In the afternoon, participants were divided into three groups to attend cross-cultural connection workshops. The training sessions were led by Ingrid Landes, Darijo Visevic and Heike Fahrur of Working Between Cultures. During their workshops, students explored their commonalities despite different nationalities, cultures and professional backgrounds in the wheel of commons. They also shared personal details about their heritage and learned to understand the various dimensions of culture.

The training was designed to expand the students' intercultural skills when it comes to collaborating with people of different cultural backgrounds. In doing so, the sessions helped to build a mutual understanding of peculiarities in intercultural and international contexts and to prepare the participants for the upcoming group work task. After all, diversity and its mutual recognition can be a powerful driving force for innovative solutions – which is exactly what we were hoping for the group work sessions.



Introductory talk with Dr.-Ing. Björn Schäfer

MONDAY, 22/08/2022

It's all about infrastructure.

Full schedule on Monday morning: In the first session, Prof. Dr. Haydar Mecit (Institute for Electro Mobility / HS BO) invited students to take a closer look at mega-cities as an imminent source of our urban problems and a “has-to-be” place for solutions. He emphasized the importance of optimizing mobility offers through the intelligent use of information and communication technologies, with digital networking being the future of mobility as a service. Using the example of the „Climate District“ of Herne, he illustrated how a change to multi- and intermodal travel can be made with help of digital infrastructure.

The second session of the day was dedicated to the EMEL project (Energy Management in Metropolitan eMobility Charging Infrastructures). Prof. Dr.-Ing. Aron Teermann (WH) emphasized that the handling of future grid conditions requires a smart cross-sector EMS. Within the EMEL project, the grid stability is sustainably optimized with AI methods, focusing on the „network climate“.

In the third session, Prof. Dr.-Ing. Iris Mühlenbruch (HS BO) focused on yet another infrastructure for mobility in metropolitan areas: cycling. She presented the huge potential of cycle highways to avoid traffic problems and ensure mobility in cities by exploring different types of cycling in-

frastructure around the world. Using the Radschnellweg Ruhr RS1 as an example, she also highlighted the challenges of the planning process and pointed out that a good understanding of the local area and engagement with the public are crucial in identifying the routes that have the highest cycling potential.

In the afternoon, the group was split up: While this allowed some groups to start working on their joint assignment, the other participants drove to the city of Herten and visited the H2 Network Ruhr. After an introductory talk at the headquarter, the group explored the hydrogen production and storing facilities, asked various questions on technical details and even took a ride in a hydrogen car.



Hydrogen production facilities at H2 Network Ruhr



TUESDAY, 23/08/2022

Getting to know smart transport modes – and putting theory to practice.

After dealing with different types of infrastructure the day before, Tuesday was all about actual modes of smart transport. Starting with the most obvious mode – vehicles for personal transport – Prof. Dr. Andreas Becker (FH DO) focused on sensing, interacting and sharing as features of the vehicles of the future. He gave a detailed overview on available and future technologies, their pros and cons as well as examples of their (mal-)functions. He emphasized that cultural differences play a role when it comes to adapting technical innovations, especially in cars, and invited students to rethink how they get around.

In the second session, Christian Kühnhold (Smart City Loop GmbH) introduced underground tunnels as a means of goods transport for major cities. He pointed out that transports in and out of our cities jam them by reaching high traffic volumes and that, consequently, logistics issues can no longer be neglected in city planning processes. A solution could consist in shared underground city hubs that ensure the most ecological use of resources and preserve the cityscape above ground for residents.

In the following session, Eric Diederich (ANTRIC GmbH) presented ANTRIC ONE: a cargo bike for city logistics and last mile delivery. As bulky delivery trucks cause 80% of

all traffic jams during rush hour, ANTRIC designed a manoeuvrable and robust e-bike truck with a modular concept that can be adapted to the needs of parcel or grocery delivery.

The afternoon was dedicated to hands-on sessions during master and bachelor workshops. Students could choose from a total of four sessions according to their study level. The groups then conducted their workshops in different rooms with the necessary equipment, e.g. for programming, calculating and brainstorming.



Mobility as a Service: gathering ideas to reduce car use

Available workshop streams:

Bachelor	Mobility as a Service – or how to wean society off the use of cars Prof. Dr. rer. pol. Stephan Keuchel and Prof. Dr. Charles McKay (Institute for Mobility and Transport at WH)	Simulation of Autonomous Vehicles with CARLA and Python Prof. Dr. Stephan Weyers (FH DO) and Basile Tousside (AKIS Interdisciplinary Institute for Applied AI and Data Science Ruhr at HS BO)
	Life Cycle Assessment of Light-Electric Vehicles Prof. Dr.-Ing. Semih Severengiz and Alexandra Zeller (HS BO)	Smart City Bochum – creating digital and sustainable solutions for a city of the future Oliver Sagner (Wirtschaftsentwicklung Bochum)



Life Cycle Assessment step 1: analysing and weighing parts



Life Cycle Assessment step 2: calculating emissions



WEDNESDAY, 24/08/2022

Smart mobility for today – and tomorrow.

Wednesday morning started with two impulse talks: In the first session of the day, Mirko Meuter (Aptiv Services GmbH) shed light on the role of machine learning in developing and operating highly automated vehicles. He emphasized that the software solutions of these vehicles for e.g. power supply, signaling, security, connectivity and user experience should be integrated in order to enable them to serve as the vehicle's brain and nervous system.

Afterwards, Elisabeth Köppen and Torsten Merken (both FH Aachen) presented two projects of the graduate school for applied research NRW and the European Center for Sustainable Mobility: SHAREuregio and SkyCab.

SHAREuregio has developed a sharing system between Germany and the Netherlands to support e-mobility in four towns across the border. Companies in the region were provided with 40 electric vehicles, thus facilitating sustainable international commuting – more than 300.000 km have already been covered.

SkyCab on the other hand is still researching answers when it comes to the possibilities, opportunities and challenges of air taxis. Elisabeth Köppen illustrated how they can become a component of modern mobility planning and showed the potential route of the SkyCab in the Rhi-

ne/Ruhr region. Unsurprisingly, many interested questions from the audience arose on this issue.

In the afternoon, the second group went on the excursion to the H2 Network Ruhr in Herten to learn about the possibilities of hydrogen as a fuel and to take a ride in a hydrogen car. Meanwhile, the other participants worked intensively on their posters.



Fuel cells that power electric vehicles were the most interesting use of hydrogen for the students.

THURSDAY, 25/08/2022

Tackling today's challenges of smart mobility.

The first session in Thursday was led by Prof. Dr.-Ing. Ralf Holzhauer (WH), specialist for recycling and waste management processes. He described the opportunities and risks of lithium ion batteries in context of the circular economy, illustrated the recycling processes and identified possible innovations.

Afterwards, Prof. Dipl.-Ing. Andreas Fritzen (HS BO) elaborated on how to change models of urban development with regard to sustainable mobility. He put a special spotlight on the Ruhr Metropolis and also made comparisons to other metropolitan areas, e.g. in Asia. The participants could also draw comparisons to their home countries and comment on international examples of urban development.

At the finale of the Summer School's professional programme, the question „Smart Mobility – the key to sustainable mobility of the future?“ was debated in a lively panel discussion hosted by Daniel Ullrich. Prof. Dr. Charles McKay (WH), Prof. Dr.-Ing. Ralf Holzhauer (WH), Prof. Dr.-Ing. Timm Braasch (WH, RMS Director), Oliver Sagner (City Bochum, Innovation Section: Mobility) and Elisabeth Köppen (FH Aachen) reflected on the chances and risks of smart mobility in the context of sustainability. Naturally, the future use of cars was a central topic of the debate and of particular concern to the students who joined in.

In the afternoon, the groups came together one last time to finalize their posters for the gallery walk on Friday.



Group work sessions



Group work sessions



Poster presentation



Poster presentation



Poster presentation

FRIDAY, 26/08/2022

15 nations, 8 teams, 1 assignment.

Today, things got serious: all eight groups mounted their posters for the joint Gallery Walk. Afterwards, each group was granted a five-minute pitch to present their ideas to both jury and fellow audience. The assignment for each group was the same: to develop concepts on how mobility in urban spaces can be made smarter and more sustainable. The ideas included smart delivery systems, improvement of the infrastructure for cyclists and even a revolution of public transport.

Not an easy choice for the jury, consisting of Prof. Dr. Tamara Appel (Vice Rector for Teaching and Studies at FH DO), Prof. Dr.-Ing. Timm Braasch (Director RMS at WH) and Dr. Daniel Krause (Internationalization Coordinator at HAR). After quite some time of deliberation, a transport concept based on autonomous driving was finally declared as this year's winner. However, as Timm Braasch summed up at the award ceremony: „Actually, you are all winners: you have developed great concepts and worked together very well in the international teams. This is a valuable experience for your professional and private future!“

Speaking of future: while the jury was busy consulting on the group work posters, all participants had the opportunity to join a digital networking event. During this session, the students could get in touch with regional companies to explore possibilities for internships, project work or even professional employment. Special thanks to the “Summer School on Green Business” cooperation, who organized the event. The cooperation is an association of companies and institutions in the NRW Environmental Industry Competence Network. It includes e.g. the University of Duisburg/Essen and the Wuppertal Institute.

Two exciting, interesting and unforgettable weeks of the International Summer School 2022 came to an end in a joint farewell party. With pizza, ice cream and guitar play – and a Summer School playlist compiled by all participants to carry both sounds and memories of the event back home.

Get-together



Ice cream bike



Best Poster Award Winner 2022



A big thank you to all those who contributed to the success of the Summer School – but most of all to the talented students, who supported the event with their attention, their questions and opinions, and their creative and empowering concepts!

Ruhr Master School is a cooperation of:

Hochschule Bochum
Bochum University
of Applied Sciences



**Fachhochschule
Dortmund**
University of Applied Sciences and Arts



**Westfälische
Hochschule**
Gelsenkirchen Bocholt Recklinghausen
University of Applied Sciences