TRAVISIONS 2024

TWO ACADEMIC
ON INNOVATIVE TRANSPORT CONCEPTS
COMPETITIONS

#TRAVISIONS
www.travisions.eu

This project has received funding from the European Union's Horizon Europe Research and Innovation programme, Grant Agreement No 101056931.

TABLE OF CONTENTS

INTRODUCTION

Ever more people and goods are moving around the world in constantly shorter timeframes. This makes innovative transport solutions an important necessity. What could future transport look like? How can existing systems and infrastructures cope with the rising strain, be it road, rail, air, waterborne or cross-modal transport systems? Which are efficient and sustainable solutions to the arising questions on mobility issues?

The series of EU-funded projects TRA VISIONS invited young and senior researchers from all over Europe to enter their ideas concerning these and other questions to the competitions.
The aim is to showcase European excellence and to increase the competitive advantage of the European transport industry by generating innovative concepts and solutions through a Europe-wide competition for both young and senior researchers in the sectors of road, rail, waterborne, airborne and cross-modal transport. The core activity of the TRA VISIONS 2024 project was the organisation of two competitions for transport research awards to be announced at the TRA 2024 conference from April 15th to 18th 2024 in Dublin, Ireland:

The TRA VISIONS 2024 YOUNG RESEARCHER COMPETITION, an academic competition with the goal of stimulating interest among young researchers and students in the field of sustainable transport;

The TRA VISIONS 2024 SENIOR RESEARCHER COMPETITION, a competition for senior researchers in the field of innovative transport concepts based on results only from EU-funded projects.

The Young Researchers Competition aims to target undergraduate students and early-stage researchers in the transport sector, stimulate their minds and give them the chance to interact with a wide scientific community on transport research and show off their ideas. On the other hand, the Senior competition, is addressed to established senior researchers and has the goal of acknowledging the excellence of the existing research and innovation potential in the field of transport in the EU.
Although the two competitions have separate evaluation procedures and different rules, they are aimed at reaching a common goal which is the creation of a scientific community made of young and senior researchers in the field of transport. The interaction between different generations of researchers and different transport mode research fields enables the achievement of the overall objective of TRA VISIONS, which is the development and deployment of innovative and cross-cutting transport solutions.
Finally, TRA VISIONS 2024 is continuing the Special Honorary Award, introduced in the TRA VISIONS 2022 edition, and dedicated to senior researchers who are about to complete or have completed their career. The Special Honorary Award is awarded to those who made an outstanding and well-recognised contribution to transport-related research and innovation in their respective field, demonstrating groundbreaking and future-oriented views and research.

Objectives

The objectives of the TRA VISIONS 2024 project are to:

- **build a vibrant community of transport innovators and researchers in Europe** to foster interaction between specialists working in transport sectors,
- **promote an interdisciplinary approach,** linking basic science, socioeconomics and applied sciences/engineering,
- **disseminate knowledge and project findings** to develop innovative transport solutions in Europe.

The TRA VISIONS 2024 project builds on the success of the H2020-funded TRA VISIONS 2022, TRA VISIONS 2020, TRA VISIONS 2018 and TRA VISIONS 2016, FP7-funded TRA VISIONS 2014, FP7-funded Young European Arena of Research - YEAR competitions, that took place at TRA in 2008, 2010 and 2012, as well as the VISIONS (FP6) and VISIONS OLYMPICS (FP7) competitions. Together, these competitions captured the imaginations of more than 2.000 students around Europe. TRA VISIONS 2014, 2016, 2018, 2020, 2022 and 2024 aimed to develop this impact even further by extending the awards to include a new competition for senior researchers and the Special Honorary Award to acknowledge excellence in transport research projects.

Impact

The expected strategic impact of TRA VISIONS 2024 includes:

Stimulating young researchers and students to submit their research work to the competition and attracting them to transport related studies.

Encouraging partners from EU-funded projects to further develop innovative ideas from their projects.

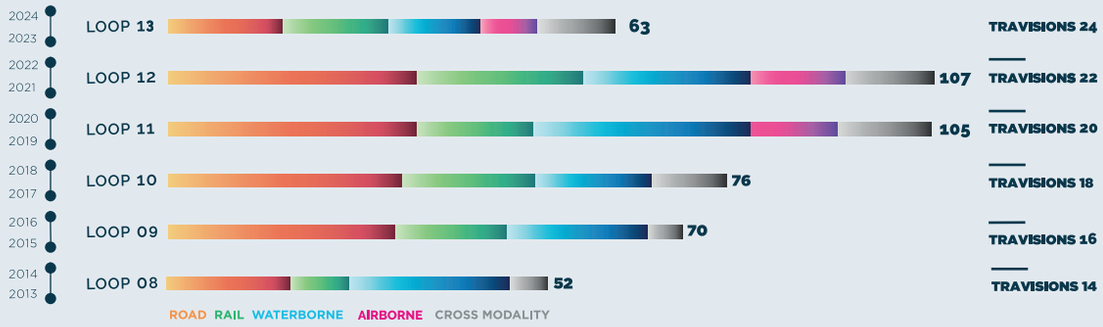
Supporting the TRA conference, which is considered as the first transport research conference in Europe, with a successful and high-quality scientific competition and strong and high-level media coverage.

Efficiently disseminating knowledge and results of European and national research projects in the area of sustainable transport, and thus improving the coordination of research, technology development and innovation and the deployment of innovative solutions in the transport sector in Europe.

TRA VISIONS is a series of EU-funded projects whose core activity is the organisation of Young and Senior Researcher Competitions for transport research awards.

The award ceremonies are organised every two years to take place at the Transport Research Arena (TRA) Conference (TRA 2014 in Paris, TRA 2016 in Warsaw, TRA 2018 in Vienna, TRA 2020 in Helsinki/ remote, TRA 2022 in Lisbon).

TRA VISIONS 2022 Award Ceremony at the TRA Conference 2022 in Lisbon



The chart above shows the number of young researchers' ideas per year and per mode. Road has traditionally been the most popular transport mode overall, while it can be seen that every year the number of submitted projects increases as the TRA VISIONS brand increases in popularity and recognition.

In the course of the six projects, including the current 2024 edition, six bi-annual academic competitions were organised and run, involving students and young researchers of European universities who were asked to generate and develop concepts for future transport related products in the sector of road, rail, waterborne, airborne and cross-modality. During the six TRA VISIONS competitions that were run:

473
innovative ideas made it to the finish line while many more were submitted as abstracts

842
young researchers were engaged as team members of the teams responsible for submitting these 473 ideas

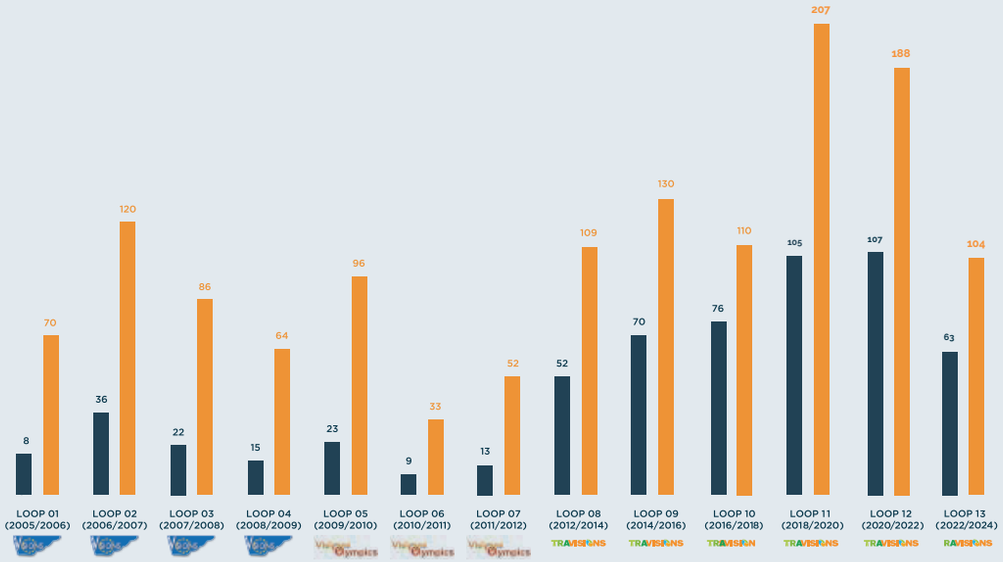
These young researchers came from more than

90
90 European universities located in 26 EU countries covering all major transport related universities in Europe

More than

238.000
of awards for the young researchers were secured from the European transport industry showing the strong commitment of the sector.

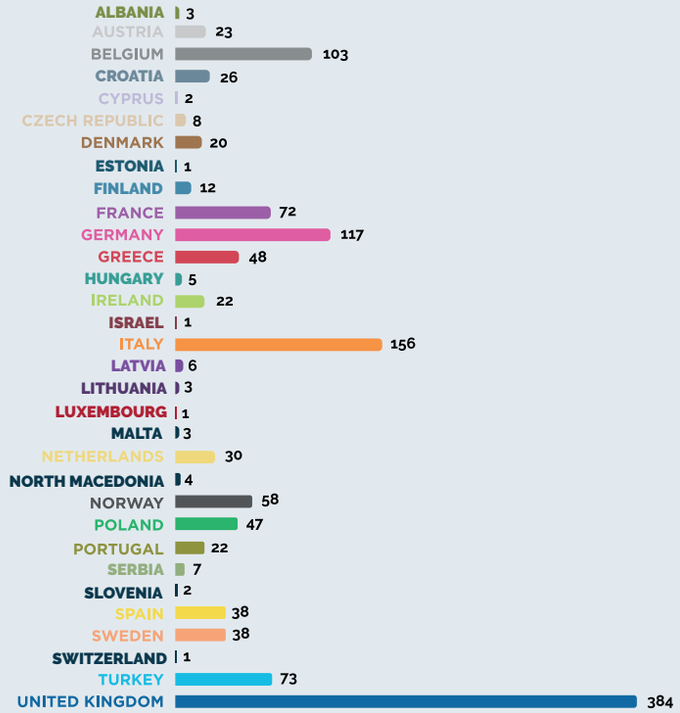
The VISIONS, VISION OLYMPICS and TRA VISIONS competitions targeted young researchers at universities and technical institutes pursuing bachelor and higher degrees, as well as early-stage PhD researchers.

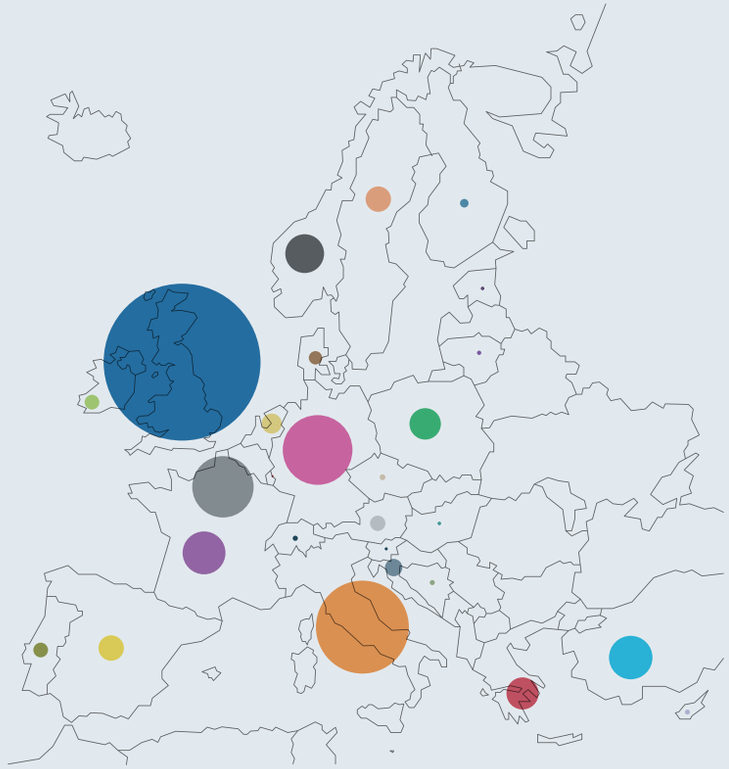


The graph shows the number of young researchers' ideas (blue bars) and the number of students (orange bar) registered per competition.

STUDENTS PER COUNTRY

A total of 1361 young researchers were engaged as members of the teams responsible for submitting 609 ideas throughout all the 13 competitions that were organised. The map shows the number of these 1361 young researchers per country. The United Kingdom was the largest contributor followed by Italy and Germany.

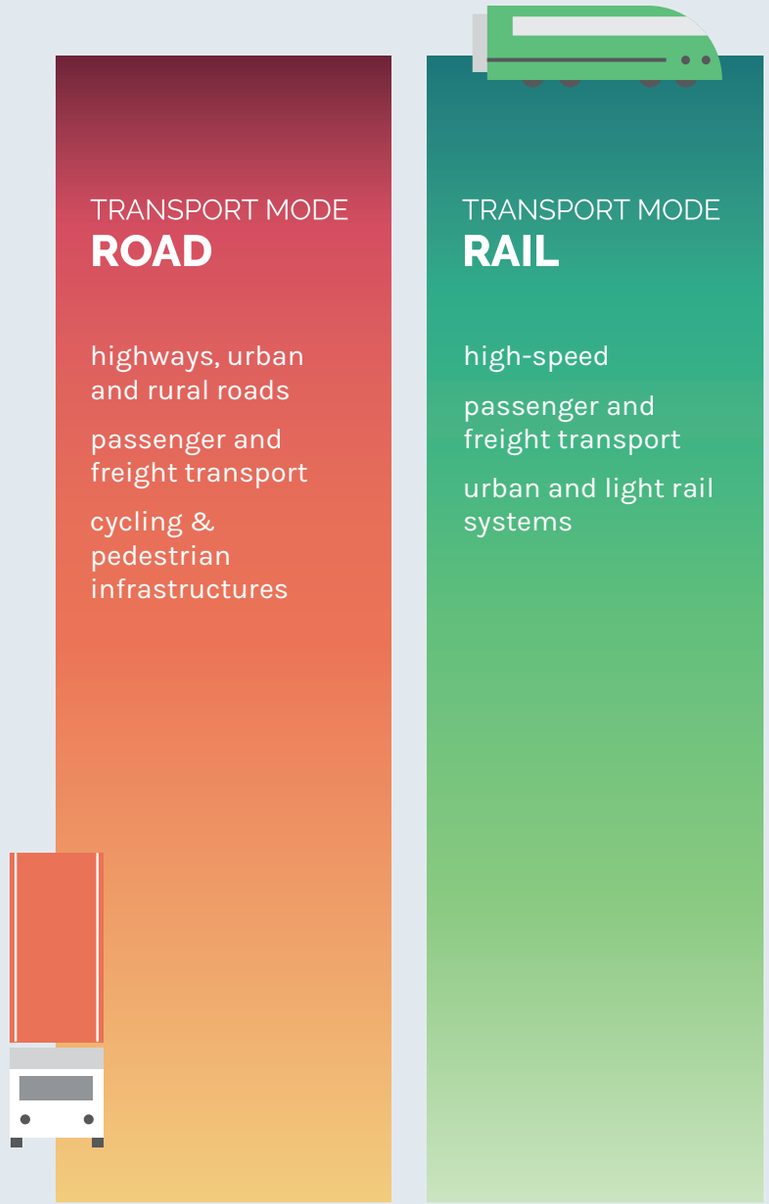




The map shows the number of these 1257 young researchers per country. The United Kingdom was the largest contributor followed by Italy and Germany.

COMPETITION PILLARS / TRANSPORT MODES

In both competitions the participants are asked to apply for one of the following pillars/transport modes:



TRANSPORT MODE
ROAD

highways, urban and rural roads

passenger and freight transport

cycling & pedestrian infrastructures

TRANSPORT MODE
RAIL

high-speed

passenger and freight transport

urban and light rail systems

TRANSPORT MODE
WATEBORNE

long distance shipping

inland waterway transport

cruise

ferries

short-sea shipping

offshore

waterborne manufacturing industry

TRANSPORT MODE
AIRBORNE

ATM and UTM, drones

aerodynamics

automation

acoustic and aero elasticity

aircraft avionics and systems

cabin design and passenger comfort

future challenges and emerging aviation risks

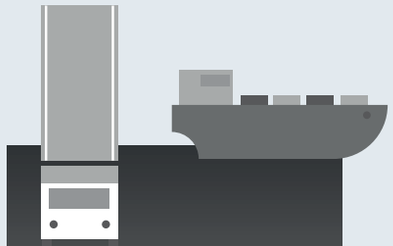
aerostructures

disruptive aircraft configurations

electric aircraft

alternative fuels & batteries

digitalization



TRANSPORT MODE
CROSS-MODALITY

multimodality

combined transport

inter-modality

integrated infrastructures

public transport

logistics

interfaces

ports

ITS

aviation infrastructures

airports

RESEARCH AREAS

The research areas/topics for both competitions are:

RA1: SAFE & INCLUSIVE TRANSPORT

. Transport safety
. People-centred &Inclusive Transport
. Future workforce & skills
. Transport Policy & Planning

RA2: SUSTAINABLE MOBILITY OF PEOPLE & GOODS

. Urban, Regional & Rural Transport
. Zero emissions Transport
. Impact on Health & Environment
. Logistics and Sustainable Transport

RA3: COLLABORATIVE DIGITALISATION

. Digital Transition
. Transport Data sharing
. Cooperative & Connected Automated Mobility
. Digital Transport Infrastructure

RA4: EFFICIENT & RESILIENT SYSTEM

. Resilient Infrastructure
. Circular Economy & Life-cycle Assessment
. Resilient Networks & Operations
. Energy & Fuel Transition

YOUNG RESEARCHER COMPETITION

The TRA VISIONS 2024 Young Researchers Competition targets students at universities and technical institutes pursuing bachelor and higher degrees, as well as early career PhD researchers.

Initially, participants are invited to submit an abstract under one of the TRA conference Topics (Call for Ideas). This is the registration period where all the participants are invited to register their ideas and submit a title and a short abstract of their ideas. The participants then usually have a three-month period to further develop their proposals into a final project following a very clear template (Submission of Ideas). This is normally followed by an Evaluation of Ideas period, divided into two steps- a first remote evaluation by two evaluators and a second step in which the shortlisted ideas (10 per mode) are evaluated by a judging panel during the Shortlisting Event in which the three top ideas per mode (road, rail, waterborne and cross modality) are identified. The winner certificates and the prizes are awarded at the TRA conference during a prestigious award ceremony.

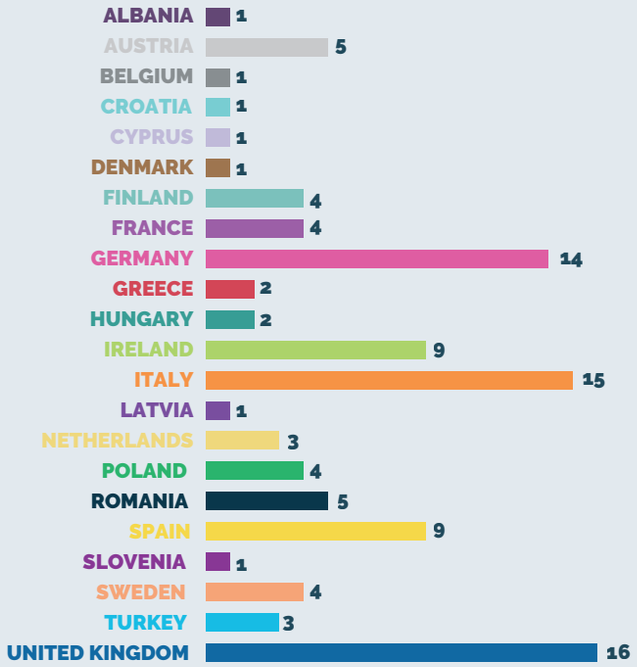
The TRAVISIONS Consortium works closely with the organisers of the TRA conference in order to ensure that the competitions have maximum exposure and impact during the conference and beyond. To ensure the active and large participation of students and early stage researchers, an extensive and well planned promotion phase is carried out.

STATISTICS AND OVERALL RESULTS

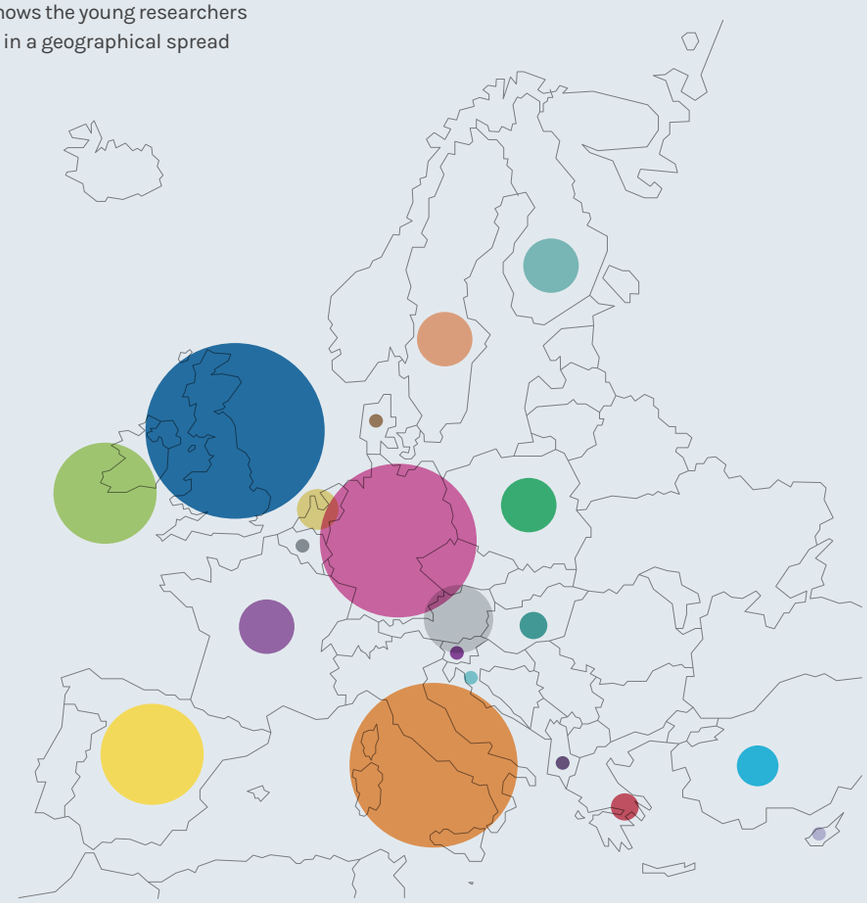
In the TRA VISIONS 2024 Young Researcher Competition, a total of 107 young researchers submitted 63 ideas. The participating young researchers were from 22 different EU countries, and 62 different universities and institutions. The following charts contain some statistical information on all the ideas.

YOUNG RESEARCHERS **PER COUNTRY**

The table below shows the number of young researchers that participated per country. Young researchers were able to join the competition as individuals or as teams of up to 7 students.



The map below shows the young researchers that participated in a geographical spread

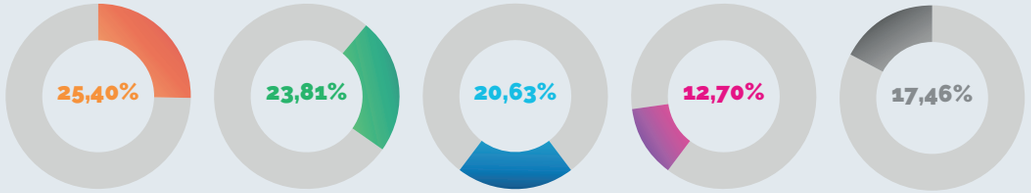


NUMBER OF YOUNG RESEARCHERS **PER UNIVERSITY**

This table shows the number of participating young researchers per university. The Technische Universität Dresden had the highest number of young researchers participating. La Sapienza University of Rome (Italy) and University College Dublin came in second, while Colegiul National Costache Negri (Romania) and Aalto University (Finland) came in third.

YOUNG RESEARCHER
IDEAS PER MODE

A total of 16 Road-related ideas were submitted, 15 Rail, 13 Waterborne ideas, 8 Airborne ideas, and 11 Cross-Modal ideas. The charts below show the number of young researchers ideas submitted per mode in percentage terms.



ROAD
TOTAL PROJECTS
25,40

RAIL
TOTAL PROJECTS
23,81

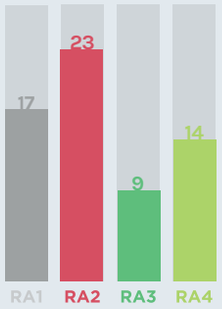
WATERBORNE
TOTAL PROJECTS
20,63

AIRBORNE
TOTAL PROJECTS
12,70

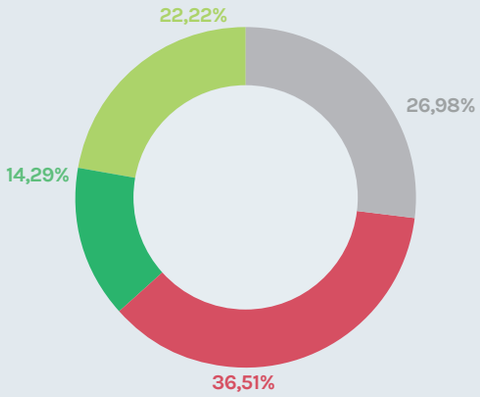
CROSSMODALITY
TOTAL PROJECTS
17,46

YOUNG RESEARCHER
IDEAS PER RESEARCH AREA

The table below shows the number of young researchers' ideas per Research Area. The most popular Research Areas were RA2 Sustainable Mobility of People and Goods, and RA1 Safe & Inclusive Transport, respectively with 23 and 17 ideas, followed by RA4 Collaborative Digitalisation, under which are 14 ideas, and RA3 Efficient and Resilient Systems with 9 ideas.

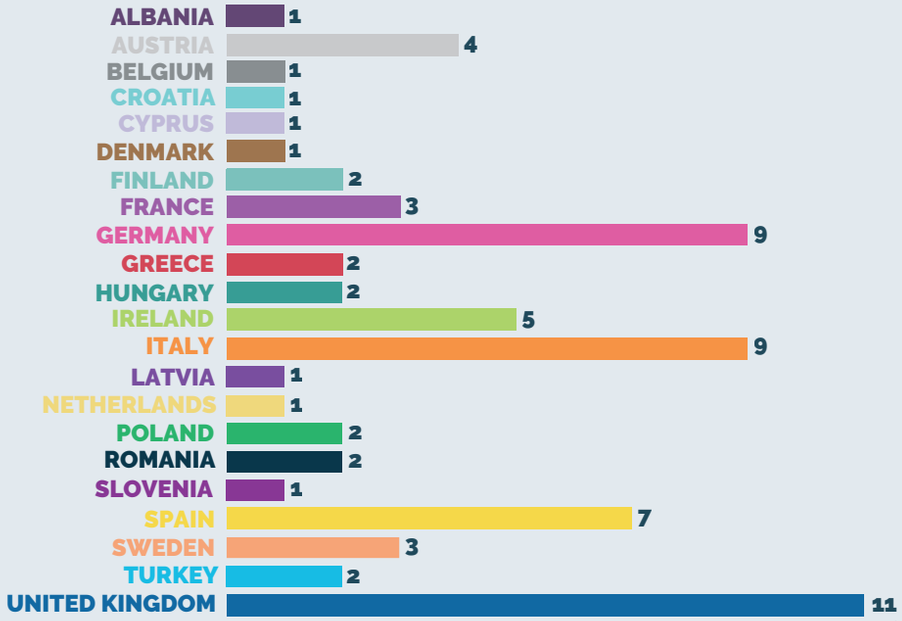


The chart below shows the number of young researcher's ideas submitted per Research Area in percentage terms.

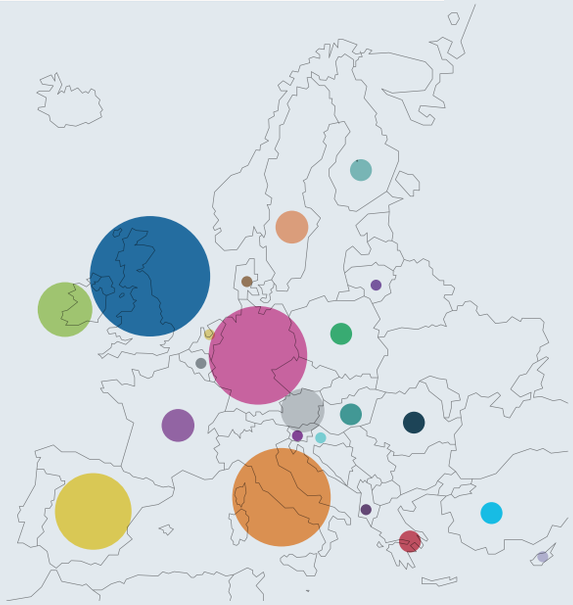


UNIVERSITIES
PER COUNTRY

The table below shows the number of universities that participated in the young researchers competition per country.



The map also demonstrates the geographical spread of participating universities per country.



TRANSPORT MODE

ROAD

1

WINNER

Henrique De Carvalho Pinheiro
Politecnico di Torino

Category: **Road**

Country: **Italy**

Research Area 2: **Sustainable Mobility of People & Goods**

Idea Number: **08**

WINNER

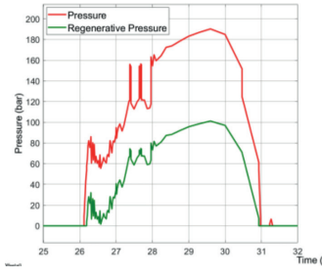
ZEDS - Zero Emission Driving System

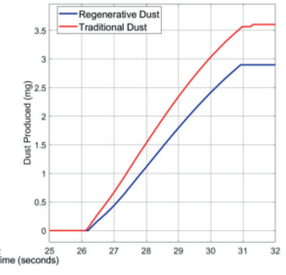
Brake dust from brake pads' and discs' wearing, poses a pervasive challenge in urban centres globally. Addressing this issue is pivotal for public health and environmental sustainability, particularly amid the growing prominence of electric vehicles. While regenerative braking in EVs shows promise in reducing wear and tear on conventional braking systems, its efficacy is somewhat limited, especially in emergency scenarios, or when batteries reach full state of charge (SOC). Although solutions like low-emission brake pads and advanced driver assistance systems leverage technologies to diminish brake pollution, they only offer mitigated effects.

The Zero-Emission Driving System (ZEDS) is a solution designed to combat secondary emissions from braking systems. ZEDS integrates in-wheel electric motors with an innovative braking mechanism based on magneto-rheological (MR) fluid actuation. By manipulating magnetic fields, ZEDS alters the physical properties of the MR fluid, generating ample braking torque, even in exigent circumstances. Unlike traditional friction-based braking systems, ZEDS operates without pad-disk friction, eliminating wear and tear entirely, eradicating all sources of secondary emissions.

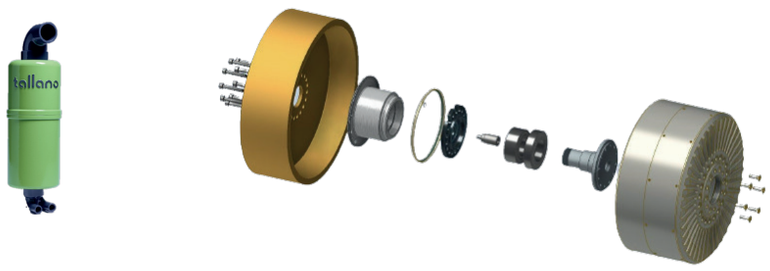
Beyond its environmental benefits, ZEDS boasts several performance advantages. Its incorporation of electrical brakes and electric motors grants it rapid response times and facilitates active stability control, enhancing vehicle safety. Moreover, ZEDS represents a maintenance-free braking solution, reducing operational costs and streamlining vehicle maintenance processes.

All components and materials utilised in ZEDS construction are recyclable and tailored for automotive applications, aligning with broader sustainability objectives in the automotive industry. With its advantages and holistic approach to emissions reduction, ZEDS emerges as a promising solution for next-generation braking systems, poised to redefine automotive sustainability standards.

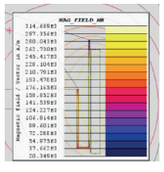




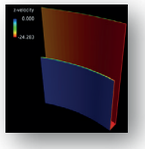
FERODO

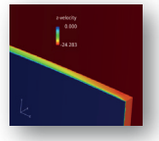


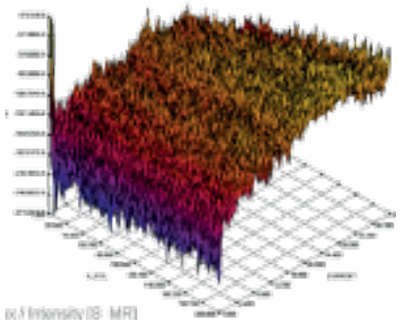
MANN+HUMMEL

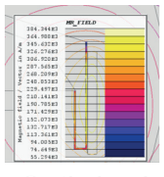


Baseline

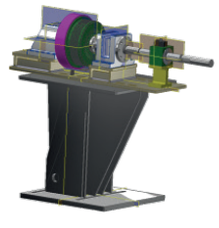








Optimized



2

SECOND PRIZE

Tommaso Bosi
Università Roma Tre

Category: **Road**

Country: **Italy**

Research Area 2: **Sustainable Mobility of People & Goods**

Idea Number: **01**

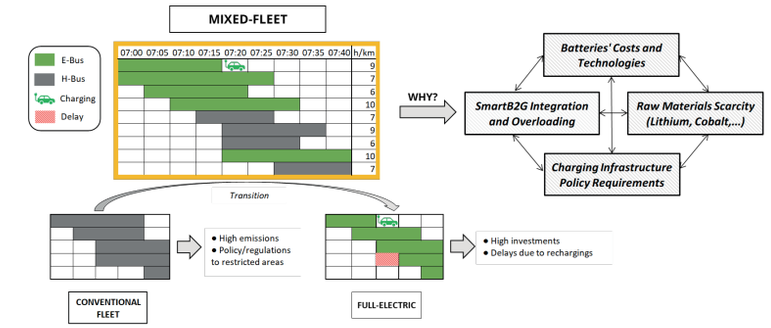
SECOND PRIZE

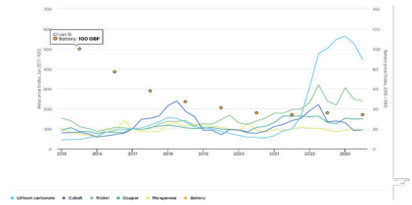
Optimising Mixed-Fleet Multi-Terminal Electric Bus Schedules with Cutting-Edge Metaheuristics

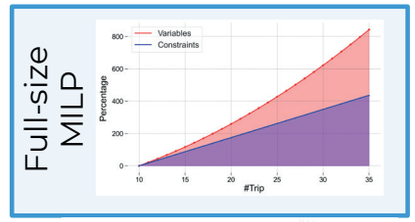
Transportation is a vital sector responsible for a substantial portion of CO2 emissions, comprising 25% of the total emissions. To combat this environmental challenge and mitigate greenhouse gas emissions, the electrification of transportation has emerged as a pivotal strategy. Within this paradigm, public transport stands out as a promising domain for the adoption of electric vehicles (EVs). Particularly, the electrification of buses in urban areas presents a significant opportunity to curb emissions. However, this transition also brings forth unique challenges, notably the Multi-Terminal Mixed-Fleet Electric Bus Scheduling Problem.

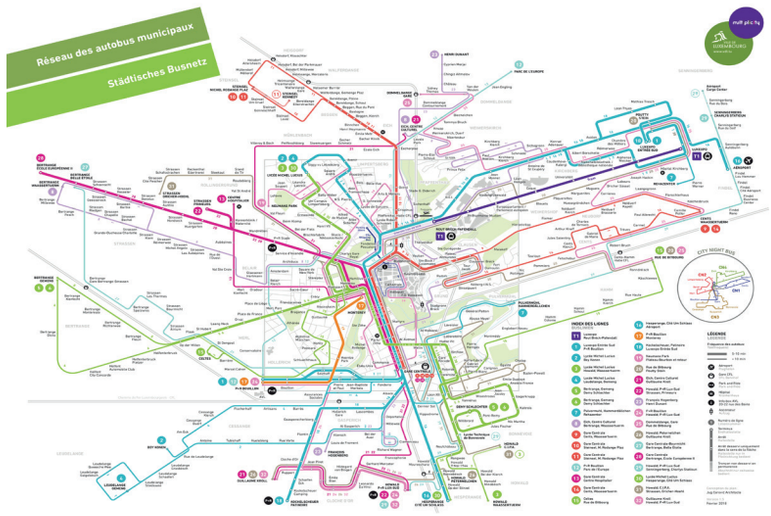
This research aims to address this challenge by exploring various heuristics and metaheuristics tailored to handle the scalability issues inherent in urban-scale instances. The study introduces two Chain-Trip Builder (CTB) heuristics to generate initial feasible solutions, complemented by two metaheuristics: Simulated Annealing and Genetic Algorithm. The former focuses on refining initial solutions through local search techniques, while the latter optimises the mixing of bus fleets, thereby improving overall operational efficiency.

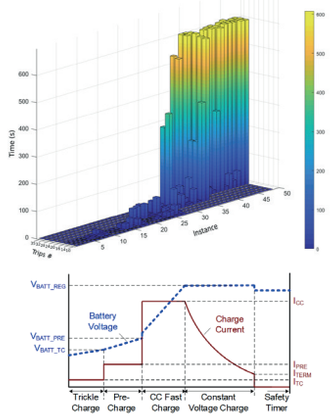
Evaluation of these methodologies was conducted using real-world data from the shuttle network of Luxembourg City, encompassing up to 1084 trips, 11 terminals, and full-day service operations. The findings reveal substantial reductions in operating costs, such as cost per mileage and charging costs, as well as decreased overheads like fleet size. Moreover, the study underscores the importance of an optimal balance in the composition of bus fleets, challenging previous assumptions favouring full-electric fleets. This comprehensive investigation offers valuable insights into efficient electric bus scheduling within urban environments, contributing significantly to the broader objective of achieving sustainable transportation systems.

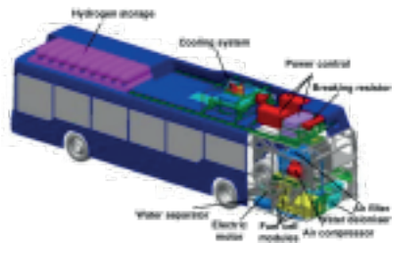


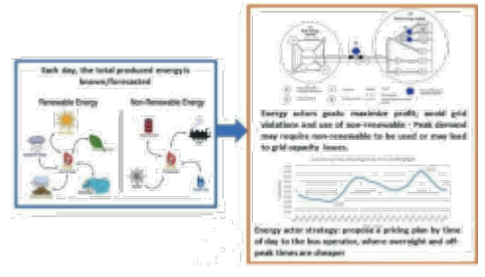












3

THIRD PRIZE

Xiaolin He, Zirui Li
Delft University of Technology

Category: **Road**

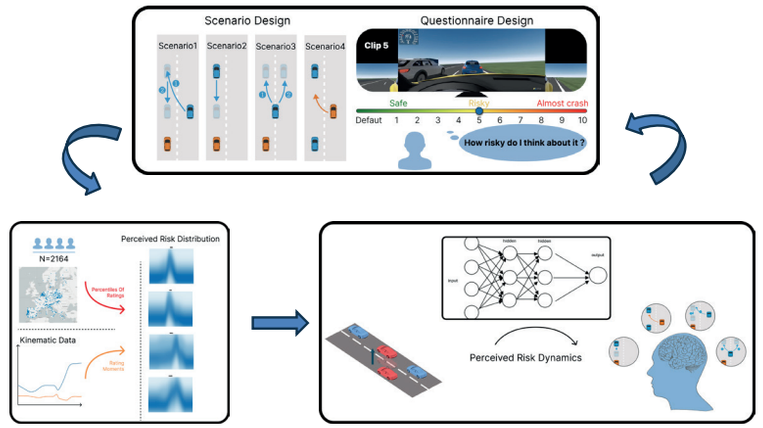
Country: **Netherlands**

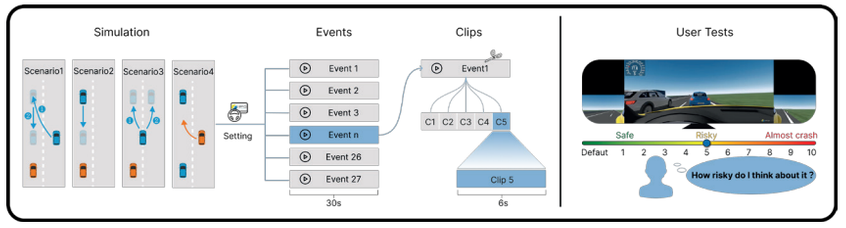
Research Area 1: **Safe & Inclusive Transport**

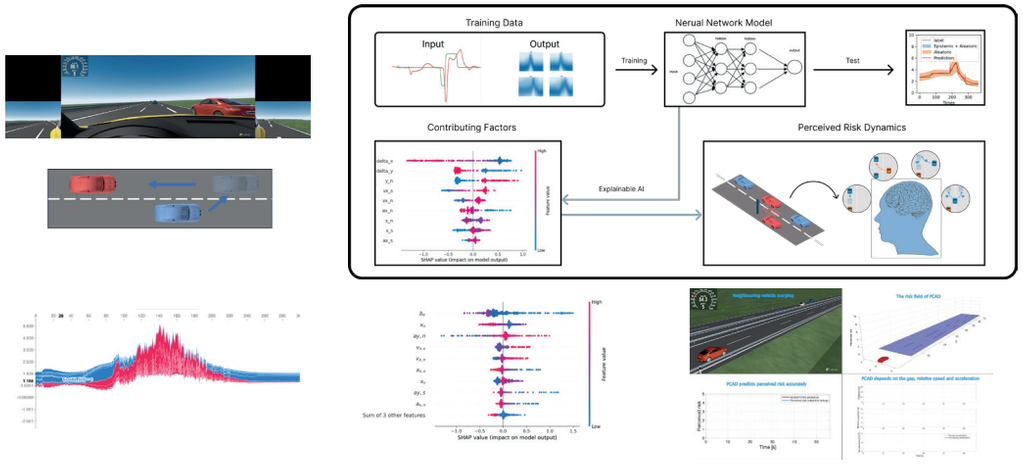
Idea Number: **57**

THIRD PRIZE

Are you scared of automated vehicles? European-level online survey and AI reveal crucial factors for the perceived risk of automated driving







The advancement of Automated Vehicles (AVs) is dependent on public acceptance, significantly influenced by the human perception of risk, termed as perceived risk during automated driving. As AVs ease dynamic driving tasks, they alter the driver's role and perceived risk, which, if misaligned, could not only cause severe accidents, but deter the acceptance of vehicle automation despite its potential to enhance road safety and traffic fluidity. This leads to investigating the complexities of perceived risk. However, existing methods provide merely static insights or are limited to specific moments, necessitating a more continuous and comprehensive understanding.

This project dives into the dynamics of perceived risk. By collecting more than 180.000 perceived risk ratings with more than 2000 participants across various driving scenarios, this dataset offers a robust basis for deep neural networks to predict perceived risk. Through explainable AI methods, the project then reveals the dynamics of perceived risk, taking a significant step towards a holistic comprehension crucial for optimising AVs behaviours in real-time. This project not only bridges the knowledge gap but sets a solid foundation for future explorations, thereby promoting a safer and more acceptable driving automation experience.

Antonios Georgantas
University of Cyprus

Category: **Road** Country: **Cyprus**

Research Area 1: **Safe & Inclusive Transport** Idea Number: **62**

Bi-objective MFD-based Staggered School Schedules Optimization for the morning commute problem

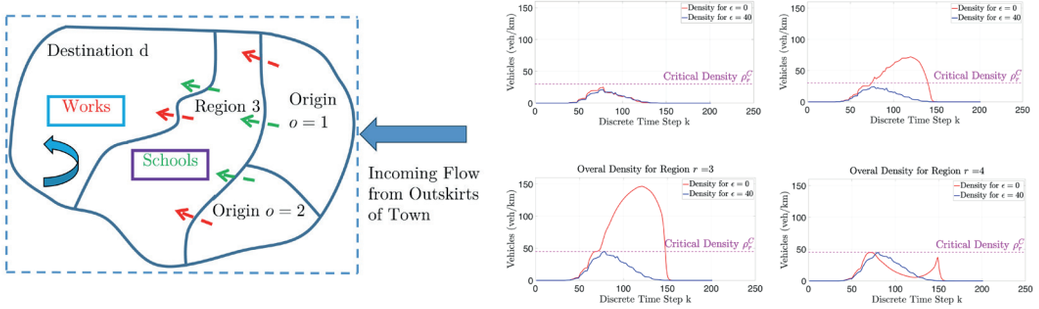
One of the major causes of road traffic congestion in urban transportation networks during the morning rush hour can be attributed to the fact that schools start at the same time. We consider two classes of commuters: in the first class, commuters are directed to the school their children are assigned to and subsequently depart towards their workplace, while in the second class, the commuters head directly to the workplace without pursuing intermediate stops. In their effort to head to their destination, both classes will unavoidably use the same part of the network at the same time, leading inadvertently to the formation of congestion. To remedy this shortcoming, this research proposes a novel macroscopic approach that regulates the start time of schools, anticipating the emergence of congestion during the morning commute.

The related problem is formulated as a Bi-Objective Mixed Integer Program (MILP) whose target is to jointly minimise:

i) the Total Time Spent (TTS) of all vehicles inside the network;

ii) the associated overall mismatch between the initial and the shifted start time of each school located in the urban network.

We demonstrate through extensive simulation experiments that by properly selecting the school start time, we can shift the demand to less congested time periods and, as a result, alleviate the congestion. Macroscopic simulation results verify the efficiency of our linear approximation solution approach, being capable of retrieving close to optimal solutions identified based on an Exhaustive Search procedure in less than three minutes.



Andrés Laverde Marín
Universitat Politecnica de Valencia

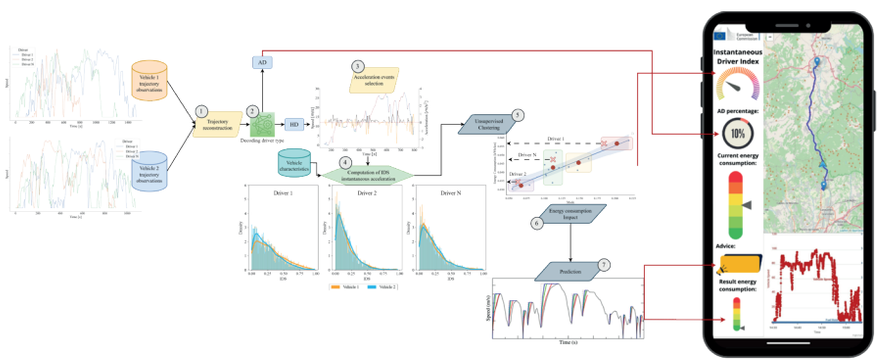
Category: **Road** Country: **Spain**

Research Area 2: **Sustainable Mobility of People & Goods** Idea Number: **73**

MAFALDA-O (MAkridis Fontaras And Laverde Driving Ai-Optimiser)

Private vehicles have a significant negative impact on the environment, with transport responsible for more than 20% of energy-related emissions. There is an urgent need to reduce emissions from vehicles. A significant reduction can be achieved by promoting the most efficient driving strategies. This research aims to fill the knowledge gap regarding the complicated relationship between individual driving habits and energy consumption, and to explore the role of drivers in causing emissions. To complement these current approaches, this study proposes a three-step strategy based on Machine Learning to identify and characterise drivers, quantify the impact on energy consumption, and perform transportation system optimisation. The proposed solution also includes a tool that provides real-time feedback to drivers to optimise their vehicle's energy consumption.

MAFALDA-O proposes a comprehensive tool that provides real-time feedback to drivers to optimise the energy consumption of their respective vehicles. This tool is based on classifying and categorising drivers based on their driving aggressiveness. Based on advanced machine learning techniques, we can characterise driver aggressiveness and find a correlation with energy consumption. In this way, we can determine the impact of the driver's driving style on energy consumption. The method allows classifying drivers in different clusters considering their driving behaviour and quantifies the corresponding energy efficiency for each case. In this way, we can compare the different cases and provide real-time feedback to drivers so that they can modify their speed profiles to reduce energy consumption.



Doron Hekic
University of Ljubljana, Faculty of Civil and Geodetic Engineering

Category: **Road** Country: **Slovenia**

Research Area 1: **Safe & Inclusive Transport** Idea Number: **26**

Monitoring of typically overlooked non-landscape bridges utilising cost-efficient SHM alternatives

Over 50% of bridges worldwide are older than 50 years, and many exhibit structural deficiencies. In the last 20 years, the collapses of bridges in the EU caused nearly 120 fatalities. At the same time, passenger and freight traffic in OECD countries may double between 2019 and 2050. Therefore, it is of utmost importance to develop and implement innovative methods and technologies that will facilitate infrastructure managers to effectively monitor their assets' condition.
Nowadays, most landscape bridges have installed Structural Health Monitoring (SHM) systems; this is only exceptionally true for short- and medium-span bridges. Contrary to SHM systems, the main criterion for equipping a bridge with a weigh-in-motion system (B-WIM) is acquiring traffic loading data at a specific location. This research aims to utilise B-WIM systems beyond their primary weighing function by reusing measurement results, most often strains, to update the bridges' Finite Element (FE) models. The performed analyses utilising data from actual bridges demonstrate the possibility of updating FE models with B-WIM systems, providing results comparable to those from much more expensive SHM systems. Successful implementation of the proposed approach will extend the applicability of B-WIM systems and allow using cost-efficient SHM systems on typically overlooked non-landscape bridges.

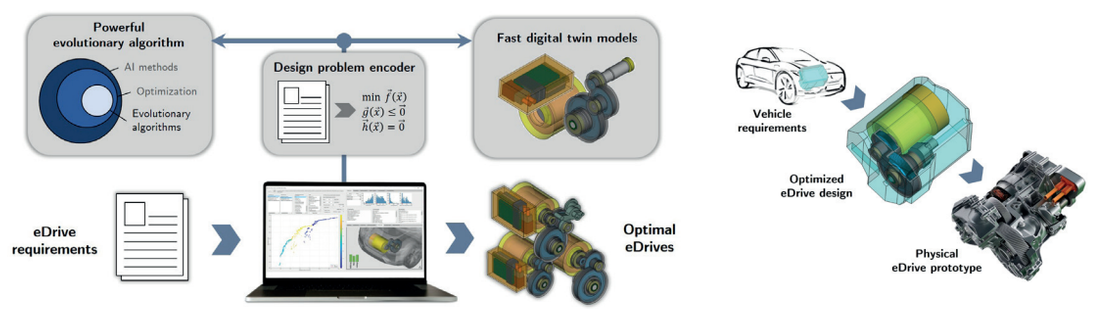
Martin Hofstetter, Dominik Lechleitner
Graz University of Technology

Category: **Road** Country: **Austria**

Research Area 2: **Sustainable Mobility of People & Goods** Idea Number: **68**

Multi-Objective Design Optimization Method for Electric Powertrains

Electromobility and thus electric powertrains (eDrives) are key technologies in the fight against climate change. Renewable, green energy must be used as efficiently as possible to achieve long driving ranges, which is why energy efficiency is a key design objective in the development of new eDrives. Moreover, costs and performance are crucial to convince as many people as possible to adopt electromobility. Furthermore, a compact package design is crucial for integration into the vehicle. These requirements and objectives in general represent a complex area of conflict.
In order to find the best suitable eDrive design, this research presents a computer-automated, multi-objective optimisation method. It automatically designs the complex eDrive system consisting of an electric machine, power electronics and gearbox. The result is a so-called Pareto front, containing optimal tradeoff solutions, which are tailor-made for the specific vehicle requirements. The design problem is solved by an artificial intelligence method called differential evolution, in combination with fast digital twin models. The state of the art is extended such that the eDrive system consisting of electric machine, gearbox and power electronics is optimised holistically regarding conflicting objectives of energy efficiency, costs, performance and package space. The method's effectiveness is proven by a case study including a particularly energy-efficient demonstrator vehicle. In summary, the industry-approved optimisation method leads to improved product and process quality in the design of electric powertrains. This improves customer-relevant criteria, such as driving range and costs of electric vehicles - thus contributing to widespread application of environmentally-friendly and sustainable electromobility.



Gabriella Buttitta, Pamela Maria del Rosario Peguero
University of Palermo

Category: **Road** Country: **Italy**

Research Area 4: **Efficient & Resilient Systems** Idea Number: **23**

Measuring social sustainability: towards social indicators for road pavement materials

Sustainability is mostly linked to its environmental and economic components, while society, the third pillar, is forgotten. Workers, consumers, local communities, value chain actors, and other stakeholders are affected by road infrastructure throughout its life cycle (including construction and use). How do roads affect these stakeholder groups? What social impacts has the management of roads on citizens and users?

Until now, very few studies have addressed this subject. Considering this gap and that life cycle-based techniques are the most powerful tool for assessing the sustainability of products and projects, the research started the investigation on Social Life Cycle Assessment (S-LCA) of road pavement materials. The Social Hotspot Analysis, performed using the Social HotSpot Database and PSILCA, identified the most relevant social issues in a cradle-to-gate approach, and the literature supported the investigation. This is the point of departure towards the definition of a set of social indicators and their further calculation. The introduction of S-LCA in road pavements can lead towards a holistic assessment fostering resilience and efficiency of new infrastructures.

Amirreza Kandiri
University College Dublin

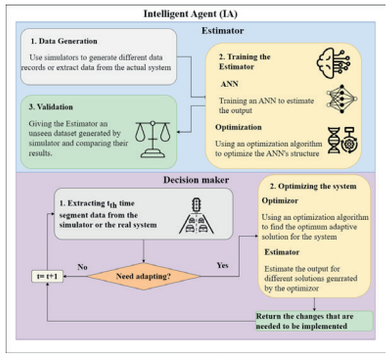
Category: **Road** Country: **Ireland**

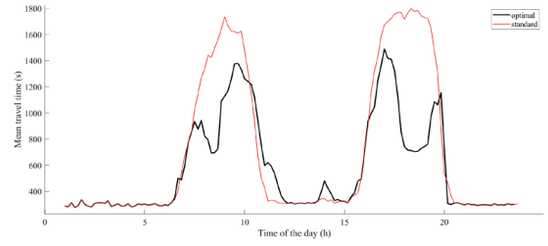
Research Area 3: **Collaborative Digitalisation** Idea Number: **09**

Automated adaptive traffic network: Adapting the M50 in real-time by optimising speed limits using a hybridised optimisation algorithm and artificial neural networks

Since the last century, traffic congestion has been one of the most important issues in urban areas, which results in pollution, fuel cost, loss of time (work hours), and stress and anxiety. Two main solutions have been tested to solve this problem: a) expanding the traffic infrastructure, which is significantly costly and hard to implement, and b) reducing the number of vehicles by encouraging people to use shared transportation (providing cheap and convenient shared transport alternatives) and discouraging the usage of private vehicles (such as tolls and fines), which is crucial due to growth in demand and people's expectation.

It is possible to increase the traffic network efficiency by adapting the existing network to ongoing operational conditions, especially in bottle neck conditions. In this research, to minimise travel time losses, speed limits are optimised to adapt the traffic network to its specific operational conditions in real-time. To do so, an intelligent agent is developed (see Figure 1) to estimate the traffic in part of the M50 motorway in Dublin, and is given the capability to learn and change the operational scenarios of the motorway that allow it to perform online management of its speeds. Results, tested in SUMO, indicate that the intelligent agent can reduce the travel-time at peak congestion by a maximum of 60% in average travel times for a period of 10 minutes, but that it has an overall significant benefit to alleviate congestion in the M50 section of interest during peak times (see Figure 2).





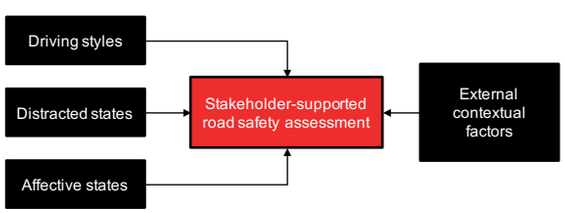
Jimiama Mosima Mafeni Mase Jimiama Mosima Mafeni Mase
University of Nottingham

Category: **Road** Country: **United Kingdom**

Research Area 1: **Safe & Inclusive Transport** Idea Number: **06**

Collaborative, Context-Aware and Intelligent Driving Risk Assessment

Trucks and heavy goods vehicles (HGVs) are at the forefront of trade and commerce in Europe. As a result, there are great efforts by researchers, governments and transport companies to reduce the road safety risks associated with them. With the abundance of sensors installed in vehicles that constantly gather data about drivers' actions, vehicle characteristics and environmental conditions, advanced computational and artificial intelligence (AI) methods are now being explored to automatically characterise the manner by which drivers operate vehicle controls and assess their impact on road safety. However, commercial driving is affected by the synergy and interaction between drivers' driving styles, drivers' physical and mental states, technologies and external factors, which are not considered in current intelligent driving assessment systems. Information about the synergy and interactions of these factors on driving is required to produce comprehensive and reliable driving risk assessments. To overcome the aforementioned challenges and limitations in assessing commercial driving risk, this multidisciplinary research aims at collaborating with crucial stakeholders in the driving sector to capture and evaluate the impact of contextual factors on commercial driving for the development of more reliable, intelligent driving risk assessment systems. To achieve this aim, a hierarchical fuzzy expert system is explored to capture and embed collaborative insights from stakeholders into the decision-support system. It is expected that the proposed system will provide timely and reliable support to road users, assist in the development of trustworthy monitoring and feedback in-vehicle technologies, and ultimately, support safe driving.



Methodology for expedient evaluation of road marking loss at pedestrian crossings

Adrian Piegza, Antoni Krawiec
Cracow University of Technology

Poland

Road RA1

Carbon footprint analysis by using a multi-region input-output model of the German freight transport sector

Kadhim Abbood
Budapest University of Technology and Economics

Hungary

Road RA2

Shared Mobility utilising underground vehicle tunnels

Cormac McKay
Trinity College Dublin

Ireland

Road RA2

TRANSPORT MODE

RAIL

RAIL

1

WINNER

Rakel Robles
University of The Basque Country

Category: **Rail**

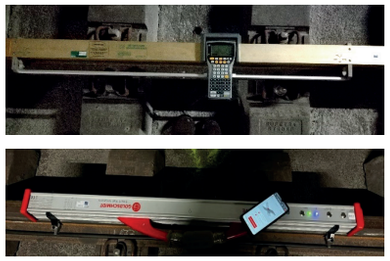
Country: **Spain**

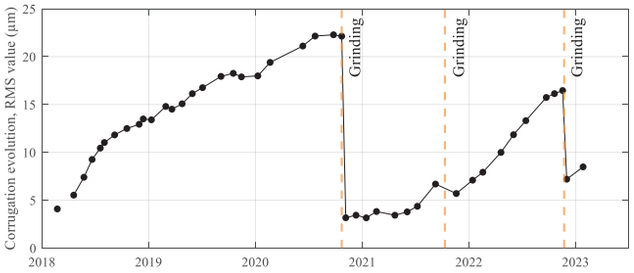
Research Area 4: **Collaborative Digitalisation**

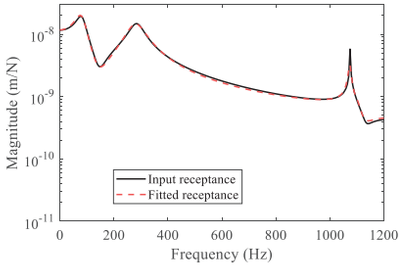
Idea Number: **58**

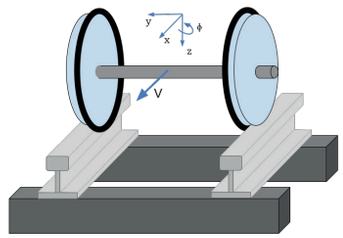
WINNER

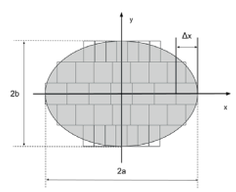
Development of an advanced model for the suppression of corrugation wear in railway rails

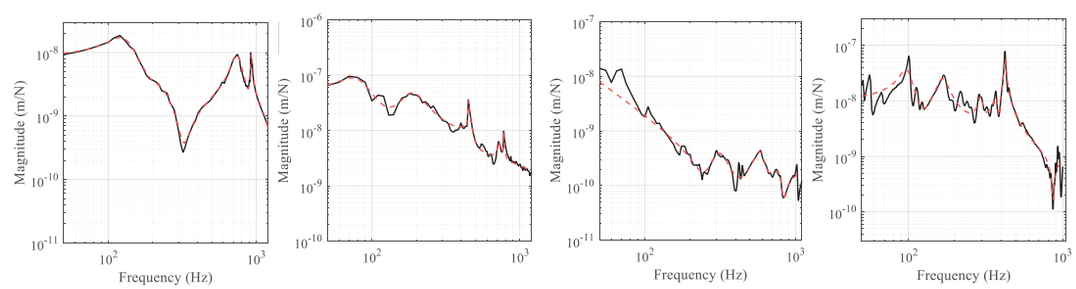


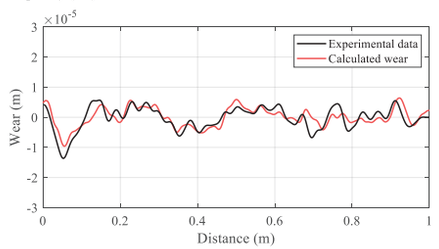


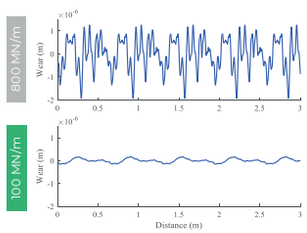












Rail corrugation is a type of irregularity that appears on the rolling surface of the rail, in the longitudinal direction of the track. This irregularity appears in most of metro lines all over the world, causing significant noise and vibration problems and reducing the service life of both the track and vehicle. Therefore, it is a subject on which a large number of studies have been conducted over time. The only way to eliminate rail corrugation once it has already developed, is by grinding the rail surface. This procedure entails significant maintenance costs, so different alternatives have been studied over time.

The models developed for this research of corrugation predict the wear that will occur on a specific line, under certain traffic conditions. This is advantageous for maintenance planning. In this study, a computationally very efficient time/space domain model that combines vertical and lateral dynamics of wheelset and track has been developed for corrugation prediction. The advantage of this model lies in the introduction of lateral vehicle and track dynamics, as it is of great importance in tight curves. In parallel, the evolution of corrugation has been studied experimentally in a metro line where this phenomenon developed prematurely after its inauguration. The model has been validated through the experimental corrugation measurements carried out monthly over more than 5 years. Thus, this study provides feasible solutions against corrugation growth in this line and in similar metro lines, by a simple adaptation of the model developed.

2

SECOND PRIZE

Jing Shan
Technical University Dresden

Category: **Rail**

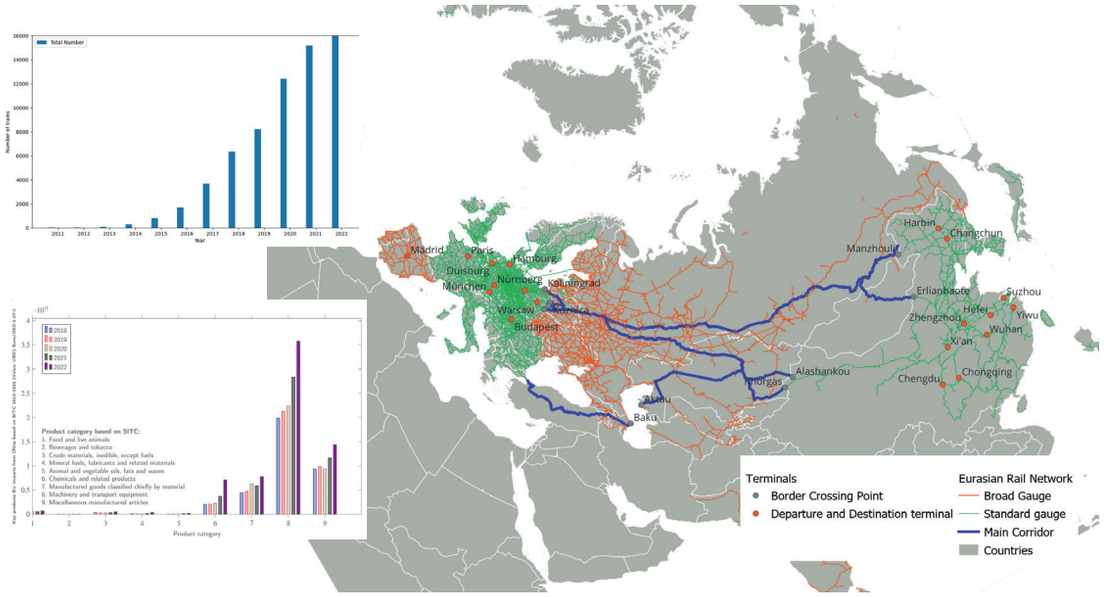
Country: **Germany**

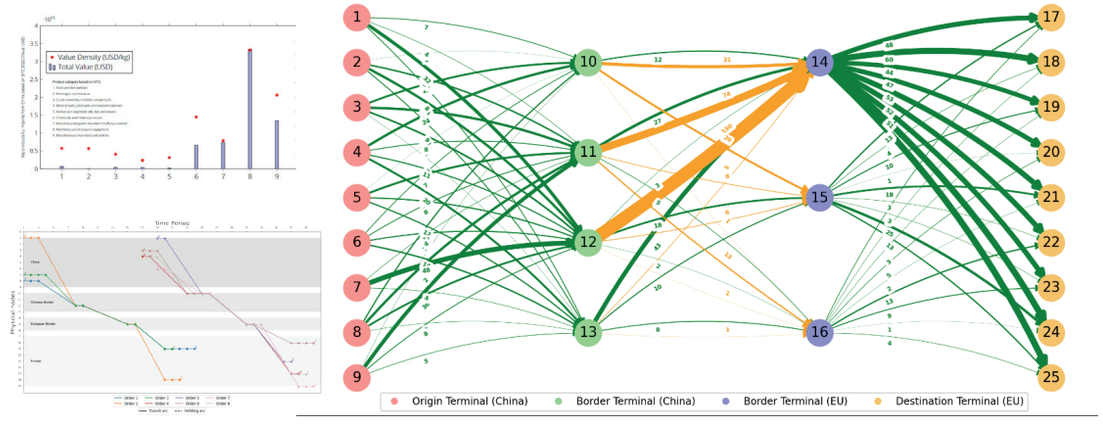
Research Area 4: **Collaborative Digitalisation**

Idea Number: **53**

SECOND PRIZE

Supply Chain oriented Integrated Tactical Planning Method (ITPM) for international rail freight transport





International rail freight transport has grown in importance in the Supply Chain as the most environmentally friendly mode of transportation. Demand for international rail freight transport, such as Eurasian rail transport has skyrocketed in the last decade. A new rail corridor connecting India to Europe via the Middle East and the Mediterranean Sea has recently been revealed as well. International network planning is challenging. Existing academic research on railway planning has focused on regional and domestic scales and often ignores the global nature of the problem. Border crossings and varying train lengths are major challenges. In addition, rail planning has traditionally prioritised operations, frequently overlooking diverse supply chain transport needs. Improving isolated railway components of a rail system is insufficient, and the lack of integrated decision-making tools results in suboptimal results.

The purpose of this research is to close these gaps by introducing the Integrated tactical Planning Method (ITPM). The ITPM includes the I-FSND and I-SSND models, and the case study evaluates the ITPM's performance on a real-world Eurasian freight rail network. The results show that ITPM has the potential to customise the service portfolio for the Eurasian rail industry.

3

THIRD PRIZE

Yago López Rivera
Universidad Politécnica de Madrid

Category: **Rail**

Country: **Spain**

Research Area 4: **Collaborative Digitalisation**

Idea Number: **63**

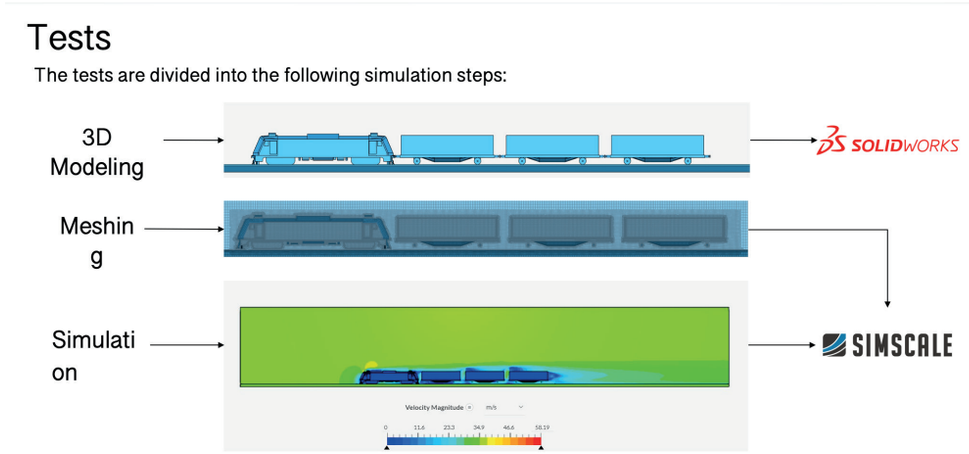
THIRD PRIZE

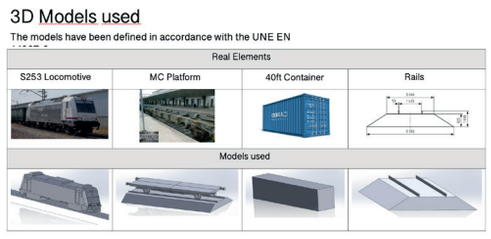
Computer-Aided Aerodynamic Analysis of Freight Trains

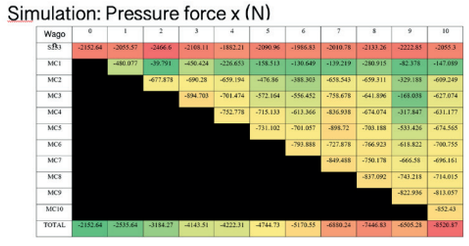
This research delves into the aerodynamic analysis of freight trains, emphasising the crucial role of train length and load distribution in determining aerodynamic coefficients such as drag and lift, at 120 km/h. Utilising advanced Computational Fluid Dynamics (CFD) simulations, the study derives mathematical expressions to compute these coefficients. A theoretical introduction elucidates turbulence phenomena and train aerodynamics theory, laying the groundwork for a deeper understanding of the simulation software and its associated parameters.

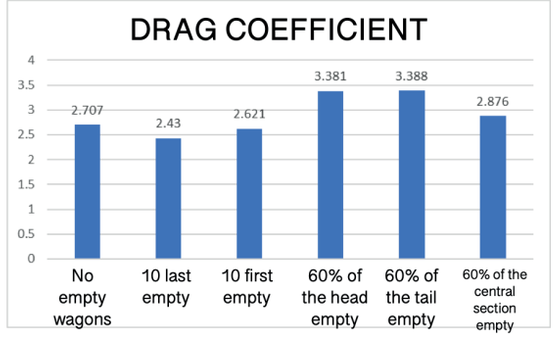
Within the realm of Reynolds-Averaged Navier-Stokes (RANS) turbulence models, an exploration of the k-? SST model is undertaken, justified by its superior accuracy in the near-surface region. The study outlines the methodology employed, encompassing CAD geometry design using SolidWorks, meshing operations in Simscale, and CFD simulations utilising OpenFOAM within the Simscale platform. Upon generating simulation results, an analysis encompassing verification of convergence, generation of insightful visualisations, and statistical modelling to approximate the behaviour of drag coefficients is conducted. A crucial aspect involves results' validation through comparison with prior research, affirming their consistency and reliability.

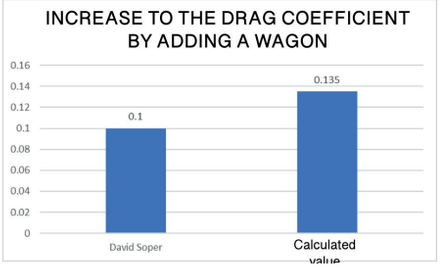
Numerical tests reveal the variation of drag coefficients with train length and the nuanced impact of empty wagons within a convoy. Statistical modelling enables the identification of optimal configurations, with an average absolute error of 8.6% in approximating drag coefficient behaviour. Furthermore, qualitative and quantitative assessments show the most favourable distribution of loads within a convoy, showcasing the advantages of leaving 60% of the central area empty. These findings contribute to optimising freight train aerodynamics, enhancing efficiency, performance, and sustainability.











Sebastian Pissermayr
Vienna University of Technology

Category: **Rail** | Country: **Austria**

Research Area 4: **Collaborative Digitalisation** | Idea Number: **75**

Route-Specific Fatigue Damage Assessment of Aerodynamic Loaded Noise Barriers Located Along High-Speed Railway Lines

Preserving noise barriers along high-speed railway lines is crucial for societal well-being, as they play a vital role in reducing train-induced noise pollution. Residents benefit significantly from these barriers, as they mitigate the adverse health effects associated with railway traffic noise, such as sleep disturbances, stress, and cardiovascular illnesses. The primary concern regarding the remaining working life of these barriers typically revolves around fatigue failure in the main supporting steel posts, induced by the aerodynamic loading generated by passing trains at high speeds.

Modern railway operators collect detailed data on train speed and composition at various track sections, enabling a more thorough investigation of the dynamic load history of noise barriers along specific routes. By accurately determining the load history and adjusting it to the actual load cycles, it is possible to extend the remaining working life of these structures. This involves refining the conservative theoretical aerodynamic load model and calibrating the aerodynamic train parameters by comparing calculated fatigue damage with fatigue damage obtained from in-situ measured strains during train passing events.

Past measurements along the Austrian Westbahnstrecke have provided insights into this calibration process. Preliminary results indicate that adjusting dynamic load factors based on real measured loads can effectively prolong the barriers' working life. This calibration process not only offers benefits by reducing material usage and maintenance, but also enhances cost-efficiency, benefiting both railway operators and taxpayers. Considering Austria's extensive railway network with over 900 km of tracks featuring noise barriers, the potential for improvements and cost savings is substantial, especially as expansion plans continue in the future.

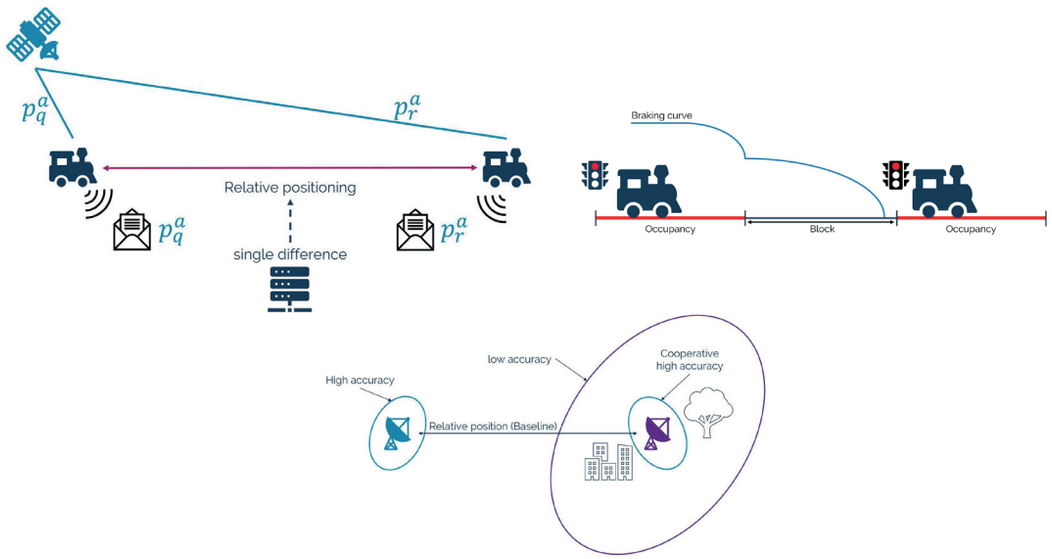
Enki Saura
Université Gustave Eiffel, COSYS-LEOST

Category: **Rail** | Country: **France**

Research Area 3: **Efficient & Resilient Systems** | Idea Number: **51**

Cooperative satellite positioning for railway

In order to offer a green alternative to individual transport in sparsely populated areas, the railway sector has the need to develop a new efficient transportation that is safe and viable by lightning their infrastructure. Satellite positioning of trains is an important lever for simplifying railroads, in particular through the introduction of satellite odometry. However, this new odometry requires improved availability and positioning integrity to meet the safety requirements. The project proposes a new method for safe train odometry using a cooperative positioning system. The idea is to have a relative train localisation by computing satellites' signal differences in a single remote computer. By reducing the number of satellites required for proper positioning, this new technique would offer better availability and, thanks to a greater number of measurements, improved robustness.



Prachiti Shinde
Aston University

Category: **Rail** Country: **United Kingdom**

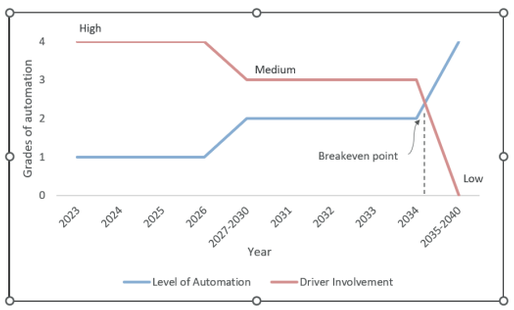
Research Area 1: **Safe & Inclusive Transport** Idea Number: **14**

Examining the Impact of Metro Expansion and Automation on Driver Resources: A Case Study of the West Midlands Metro Network

Global public transport networks are expanding their infrastructure and integrating advanced automation technology. This scenario necessitates extensive investigation into the impact on human resources, specifically drivers. This research conducted a phased analysis of the West Midlands Metro network, exploring the impact of expansion and automation on driver resources. A SIMUL8 simulation was created during Phase 1 to evaluate the current service and detect any possible deficiencies. The analysis of metrics showed variations in service performance among different stations and a decrease in asset utilisation.

The findings highlight the necessity for focused enhancements in targeted areas. A thorough analysis of current literature on extension best practices was undertaken during Phase 2 to gather valuable insights for guiding future expansion planning efforts. Data-driven probabilistic forecasting was conducted in Phase 3 to assess the range of automated driverless capabilities on a proposed expansion line and observe the impact on driver role. The findings suggest that starting with partial automation allows infrastructure stabilisation before advancing to fully driverless capabilities. This gradual timeline balances technology adoption with the need for change management within the metro organisation and its employees.

The study's findings offer valuable insights for transportation authorities regarding sustainable workforce management. It aids individuals in foreseeing and managing the evolving skill demands within the industry. The utilisation of a visualisation tool allows for the creation of automation timelines that depict the changing driver roles, aiding in strategic planning for smooth transitions.



Marko Kapetanovic
Delft University of Technology

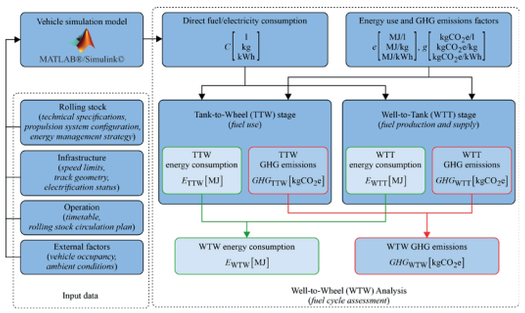
Category: **Rail** Country: **Netherlands**

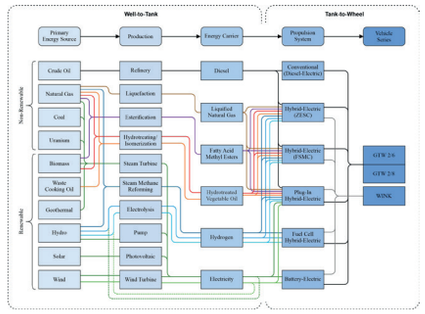
Research Area 2: **Sustainable Mobility of People & Goods** Idea Number: **56**

Traction solutions for non-electrified regional railways: A model-based comparative assessment of energy use and greenhouse gas emissions

Non-electrified regional railways require replacement of diesel traction to meet increasingly strict emissions regulations. Due to the relatively low utilisation of regional lines, complete electrification is often not economically viable. Therefore, solutions are being sought in advanced catenary-free propulsion systems and alternative low-carbon fuels. Given the range of available propulsion system technologies, energy carriers, and their production pathways, it is essential to understand the overall energy demand and GHG emissions attributed to each alternative. This information is crucial in policy decision-making and long-term planning of energy efficient and low- or zero-emission regional railway transport.

This research proposes a comparative analysis of implementations of various (hybrid) propulsion systems combined with prominent low-emission energy carriers while including commercially mature and novel technologies and energy carrier production pathways. The analysis adopts a bottom-up approach, with direct fuel and/or electricity consumption estimated via a simulation model that captures high complexity of new propulsion systems and relevant factors influencing direct energy use. Proposed method is applied in the real-world case of regional rail passenger transport in the Netherlands using energy carriers, pathways and emission factors relevant to European and Dutch contexts, providing the railway undertaking and policy-makers with new essential information for planning future rolling stock and infrastructure investments. Additionally, provided estimates of primary energy use and GHG emissions can benefit future research, especially in comparable cases when detailed vehicle, infrastructure and/or operational parameters are unavailable.





Changrong Yang
Newcastle University

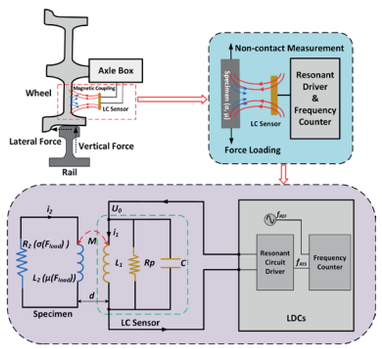
Category: **Rail** Country: **United Kingdom**

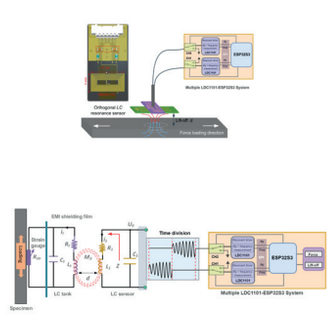
Research Area 3: **Efficient & Resilient Systems** Idea Number: **50**

Wheel-rail Contact Force Measurement Based on Wireless Inductor-Capacitor Resonance Sensing

Wheel-rail contact force measurement is significant to ensure high-speed railways' running safety and stability. Traditional strain gauges with slip rings rely on solid bonding with the wheel parts and complex signal transmission devices. From mechanics, electromagnetics, and materials, this research investigates non-contact wheel-rail contact force measurement methods by combining the change of material's electromagnetic properties under forces, geometrical change of strain gauges with inductor-capacitor (LC) resonance sensors, and wireless power transfer (WPT).

There are three phases taken into consideration. The first phase is the feasibility of LC resonance sensors on the force measurement in which the parameter selection of the sensor, the system, and the experimental set-up are studied to prove that LC resonance sensors have the potential to perform non-contact force measurement. The second phase is the measurement and separation of forces and lift-off effects (the varying distance between the sensor and the test samples) through the proposed orthogonal LC resonance sensor. The third phase is the measurement distance enhancement. A semiconductor strain gauge with high gauge factors is added to an LC tank receiver Rx. Through magnetic field coupling of wireless power transfer (WPT) and impedance change, an LC tank Tx senses the change in impedance caused by semiconductor strain gauges. Research methods contribute to the application of non-contact wheel-rail force measurement. The miniaturised and cost-effective measurement system enables IoT and real-time wheel-rail force monitoring, which provides more paths from the sensor's point of view to digital twins of running gears.





Jonas Vuitton
Technische Universität Berlin

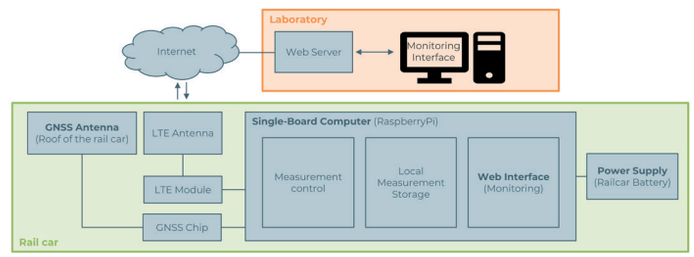
Category: **Rail** Country: **Germany**

Research Area 3: **Efficient & Resilient Systems** Idea Number: **70**

RaspberryTracking: Autonomous, low-cost positioning measurement system for vehicles in railway operations for research and development purposes

The digitalisation of railway operations, vehicles and infrastructure maintenance have a high potential to improve the efficiency, reliability, and attractiveness of the rail system as a whole. These improvements will ultimately result in a further modal shift to rail, in turn lowering emissions from transportation, and thereby helping Europe achieve the objectives of the European Green Deal. The development of these new technologies however requires gathering a substantial amount of real-life operational data, which has as yet proven difficult in practice. By effectively measuring the precise vehicle position, speed and acceleration, new tools can be developed to improve operations, such as data-driven maintenance strategies, simulation and prediction of energy consumption and driver assistance systems.

To address this issue, an autonomous, low-cost and easy-to-implement GNSS measurement system has been designed and implemented for this research purposes, enabling precise positioning measurements to be taken from a rail vehicle with little to no impact on railway operations. The system, known as RaspberryTracking, consists of a single-board computer, a high-grade GNSS module, an LTE network module for remote communication and an autonomous power supply. Additionally, the system uses a web interface, allowing for remote monitoring and control of the measurement system. This contribution presents the functionalities of the system, and requirements which led to its current design. A prototype system has already been constructed and used to gather 10.000+ km of measurements on a rail car operated on the German railway network. Technology gaps and further possible developments of the system are discussed.



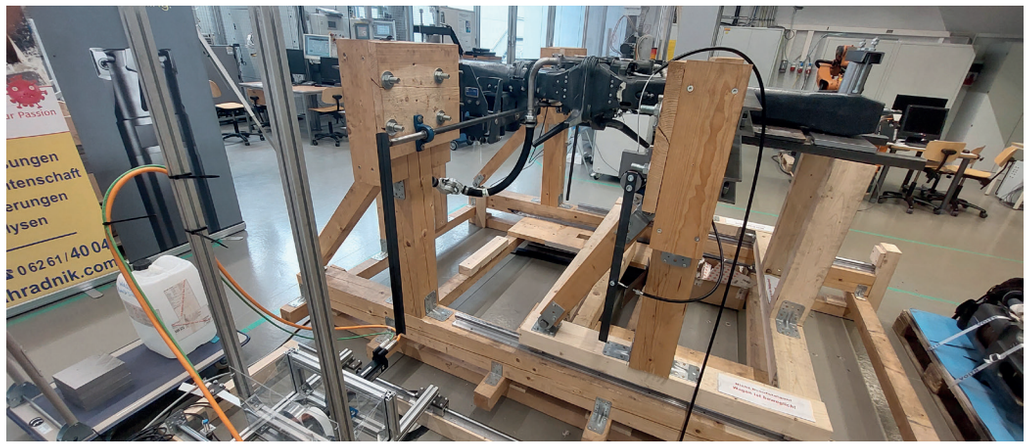
Gabriel Stephen Himmelbauer
University of Applied Sciences Upper Austria

Category: **Rail** | Country: **Austria**

Research Area 3: **Efficient & Resilient Systems** | Idea Number: **48**

Conceptual Design and Evaluation of a Device for Automatic Uncoupling of Railroad Wagons

Initiatives in Europe aim to drive innovation in the rail sector and to make transportation by train a more attractive alternative to trucks or planes. One of these new innovations in the rail cargo sector is the so-called Digital Automatic Coupler (DAC). It is set to replace the obsolete screw-couplers, which are currently used to connect cargo train wagons to each other, to improve the general efficiency of cargo transportation by rail and to act as an enabler for new technologies. This new coupling type automates the coupling between two wagons, but not the decoupling, which still has to be done manually. As such, to make use of the full potential of this new technology and to make a step towards a fully autonomous rail system, the decoupling is to be automated as well within marshalling yards.
The purpose of this research is to develop and evaluate a concept for a track-side device that can autonomously perform this task. A sensor concept to reliably identify and localise couplers is developed and tested, as pictured in the first image. A concept for the manual decoupling mechanism is proposed and constructed on a test bench, where a device to test the coupling localisation and automatic decoupling is also built, as pictured in the second image. The first results in this test environment are promising, so this system is to be tested on a DAC demonstrator train, to verify and evaluate its performance in realistic conditions.



CROP based vision & GNSS combination for train accurate localisation

Corentin Menier
Université Gustave Eiffel, COSYS-LEOST

FranceRail

RA4

A Challenge-driven Framework for Innovations in Railways

Veronica Jägare
Lulea University of Technology

Sweden

Rail RA3

Unlocking the Potential of Driver Assistance Systems (DAS) for Sustainable Rail Operations Through Train Driver Acceptance - A Longitudinal Investigation

Gina Natalie Schnücker
German Aerospace Center (DLR)

Germany

Rail RA2

Parameter estimation and CFD analysis of a Hyperloop Capsule

Jacobo Garrido Delgado
RWTH Aachen University

Spain

Rail RA2

On the Trail of West – East Signalling Interoperability: A Novel Proposal for an STM and an Interface Proposal for ETCS Onboard Operations on Class B Trackside Signalling Systems

Cagla Kivilcim Ciftcioglu
Istanbul Technical University

Türkiye

Rail RA1

YOUNG RESEARCHERS

TRANSPORT MODE

WATERBORNE

WATER

1

Hollie Black
University of Strathclyde

WINNER

WINNER

Category: **Waterborne**

Country: **United Kingdom**

Research Area 1: **Safe & Inclusive Transport**

Idea Number: **20**

AI-Driven Identification of Human Factors in Maritime Incidents

Maritime incidents continue to occur, often resulting in detrimental effects on the environment and the safety of seafarers. It is well-known within the industry that these incidents are mostly caused by human error, meaning it is of the utmost importance for any data which contains information on human error and the root causes of incidents to be processed effectively and efficiently. We can learn from these past incidents by adapting existing procedures and equipment designs to rectify the issues found from faults in the incidents.

The extraction of information from incident reports has always been conducted manually by human factors experts and can be very expensive and time-consuming. Recently Natural Language Processing (NLP) has been applied to incident reporting in domains like healthcare and construction to extract factors or root causes of the accident from reports automatically. Although there is an increasing trend in text mining, maritime has yet to develop an effective model which can extract human errors from free-text reports. Through the use of machine learning and NLP techniques, this research aims to increase the generation of human factors data by reducing the time and expertise required to analyse safety reports. With big changes to come to the industry, from decarbonisation to digitalisation, there will be changes in operations for seafarers and in turn different challenges and opportunities for human error. Understanding the near-misses and unsafe acts from internal safety reports will be vital to quickly address these issues and help prevent major accidents from occurring.

Maritime incidents have remained persistent despite changes made to safety protocols and procedures.

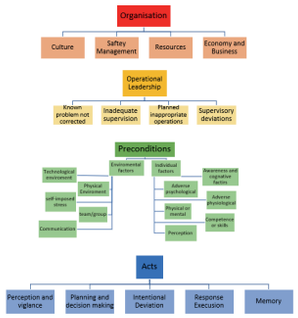
80% of all incidents have been caused by human errors.

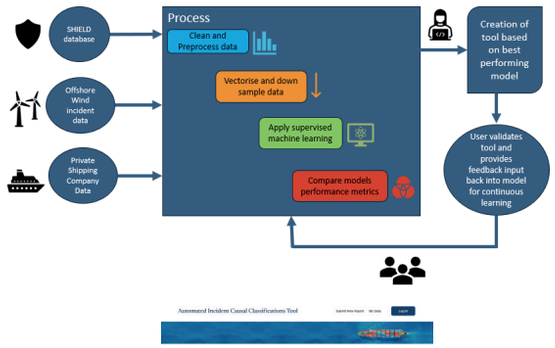
Understanding the human factors which cause these errors is detrimental to prevent future incidents.

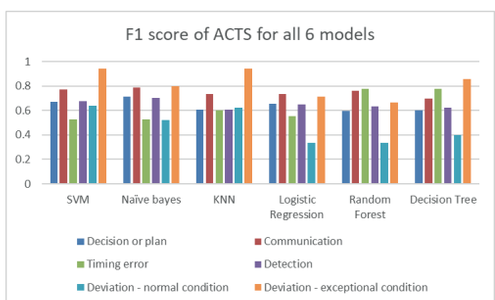
Traditionally, human and causal factors are extracted from incident reports manually.

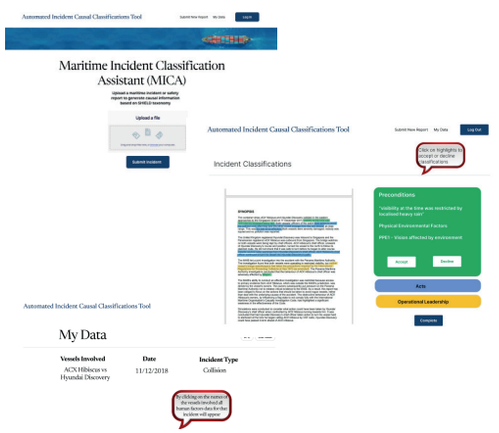
This is often very time-consuming and labour-intensive.

Recent advances in Artificial Intelligence (AI) and Natural Language Processing (NLP) have shown potential for this to be done automatically.









2

SECOND PRIZE

Thomas McDonald
Newcastle University

Category: **Waterborne**

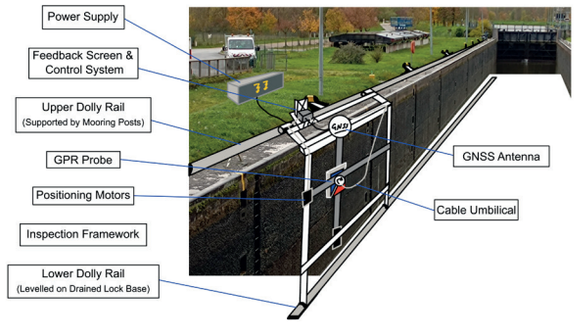
Country: **United Kingdom**

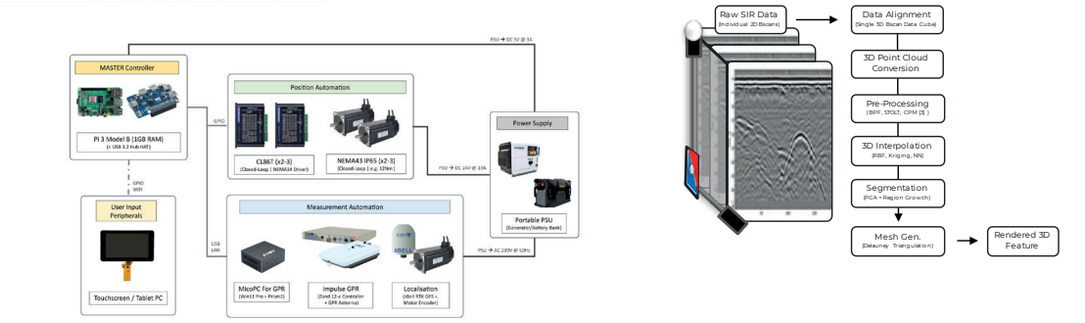
Research Area 4: **Collaborative Digitalisation**

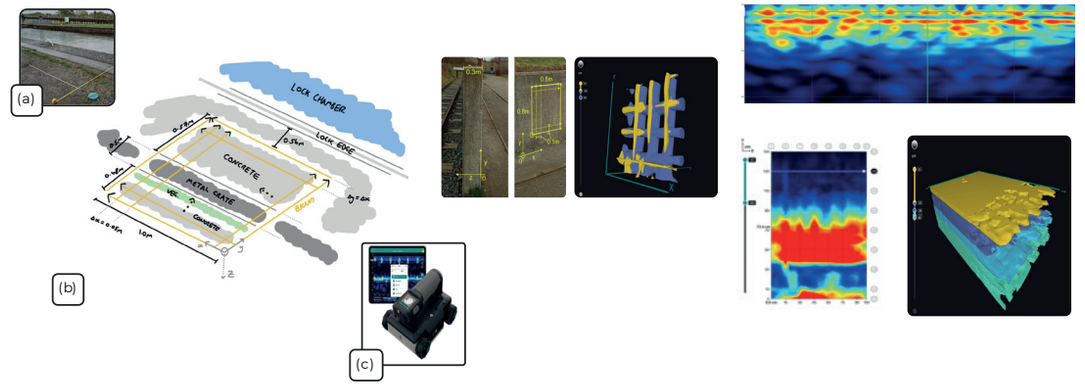
Idea Number: **64**

SECOND PRIZE

LOCK-INSPECTOR: A Dedicated Subsurface Inspection Radar System for Increasing Inland Waterway Infrastructure Resilience







Europe's Inland Waterway Transport (IWT) network extends over 38,000km, reliably transporting over 524 million tonnes of bulk cargo per year. High-capacity lock structures enable vessels exceeding 4000 tonnes to efficiently traverse sizable gradients, but inherently form network chokepoints. Closing locks for essential structural repairs thereby causes significant network disruption. Solutions to transition such maintenance from purely 'reactive' to 'predictive' conduct are urgently required, especially as more providers shift to IWT to decarbonise, increasing traffic and subsequent structural exacerbation. IWT management bodies across Europe lack inspection technology capable of effectively localising, visualising and characterising hidden critical elements within existing lock wall substructures. A dedicated solution would enable surveyors to better track, prioritise and address subsurface defects across typical decennial maintenance.

This research presents development of a dedicated Subsurface Inspection Radar (SIR) for IWT lock substructure analysis in EU-Horizon Project: 'Climate resilient and environmentally sustainable transport infrastructure, with a focus on inland waterways' (CRISTAL). This project seeks to develop a unique Digital Twin of IWT lock operations. Opportunity for applied technology transfer between rail and waterborne is initially explored. Focus on recent developments in hybrid-rotational Ground Penetrating Radar (GPR) for tunnel subsurface inspection identifies a potentially more time-efficient, scalable digital solution for large-scale lock infrastructure profiling. Adaption motivates development of the dedicated wall-profiling GPR apparatus LOCK-INSPECTOR. Hardware design for data acquisition and visualisation workflow for eventual 3D feature analysis are subsequently outlined, alongside system integration with the Digital Twin. Finally, preliminary profiling of a working French lock is discussed.

3

THIRD PRIZE

Ahmed Elkafas
University of Genoa

Category: **Waterborne**

Country: **Italy**

Research Area 2: **Sustainable Mobility of People & Goods**

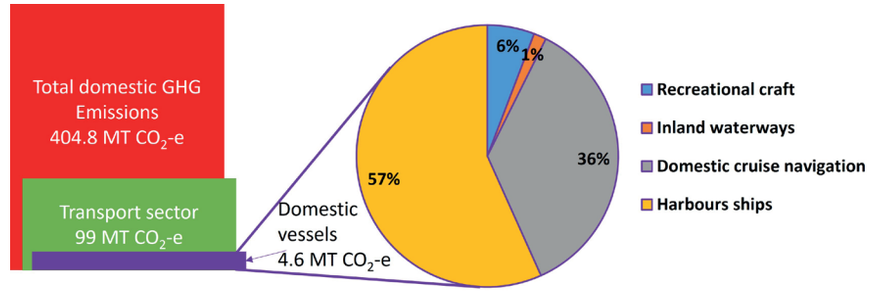
Idea Number: **31**

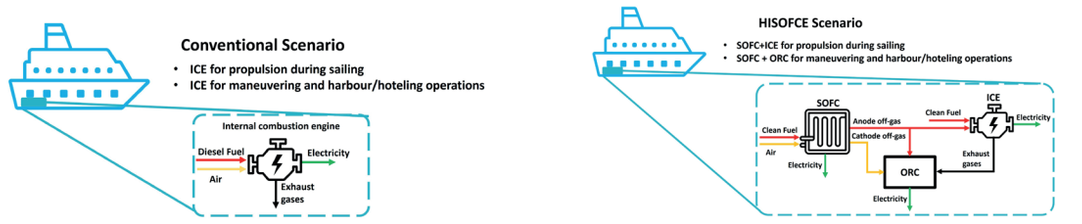
THIRD PRIZE

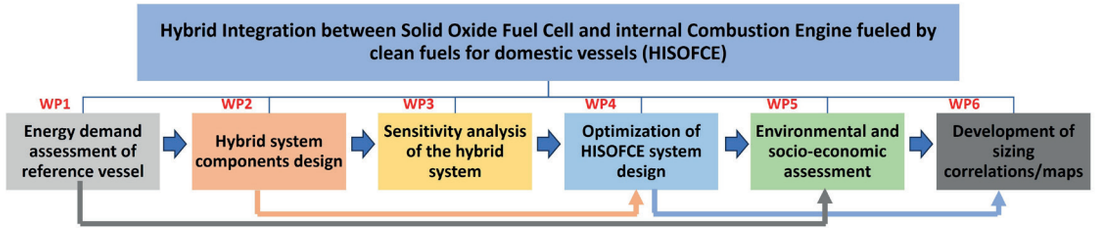
Hybrid Integration between Solid Oxide Fuel Cell and internal Combustion Engine fueled by clean fuels for domestic vessels

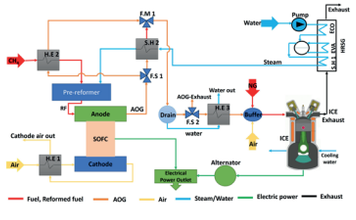
Maritime transportation is a significant contributor to the EU's CO2 emissions, comprising 3-4% of the total. Thus, the International Maritime Organization has set ambitious targets for reducing emissions, aiming for a 20-30% reduction by 2030, and achieving net-zero emissions by 2050. This drive for decarbonisation has led to a search for sustainable alternatives in maritime transport.

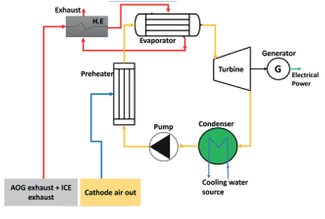
In response to these challenges, this research focuses on investigating innovative solutions to achieve a blue economy and maximise energy efficiency in maritime operations. Building on Solid Oxide Fuel Cell (SOFC) systems' reliability, the research aims to explore the integration of SOFC with Internal Combustion Engine (ICE) and Organic Rankine Cycle (ORC) technologies for maritime applications. This hybrid energy system is envisioned to operate in two distinct modes: during sailing, where ICE and SOFC are utilised to maximise electrical efficiency and minimise fuel consumption, and during port operations, where SOFC and ORC are employed to generate the electrical power required for manoeuvring and hoteling activities. Targeting the retrofitting of domestic vessels serving urban and regional transport sectors in inland waterways and short-sea navigation routes, the innovative hybrid system allows fuel consumption reduction, resulting in more energy efficiency. By promoting a zero-emission revolution, the project seeks to contribute to sustainable shipping practices in environmentally sensitive areas. Additionally, various decarbonisation pathways will be explored, considering alternative fuels such as natural gas, methanol, biogas, and ammonia. This project can have a significant impact on the maritime industry, advancing hybrid propulsion systems and fostering the adoption of sustainable vessel technologies.

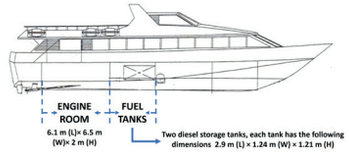












Cong Liu, Mingyang Zhang
Aalto University

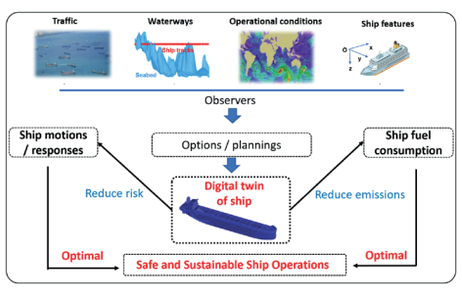
Category: **Waterborne** Country: **Finland**

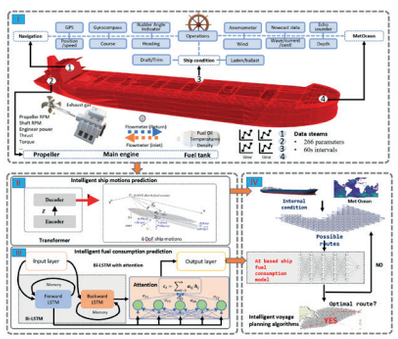
Research Area 1: **Safe & Inclusive Transport** Idea Number: **37**

AI-based digital twin for safe and sustainable ship operations

The sustainability and safety of shipping are crucial for the environment and society. Digital twins have been used to optimise ship design and operations. However, it is challenging for the traditional format of ship digital twins to effectively monitor and enhance ship safety and efficiency. This is because physical model-based digital twins have limitations in accurately representing complex operational conditions. This project introduces an AI-based digital twin to address this challenge and promote safe and sustainable ship operations. The digital twin aims to capture and optimise the ship motion and energy systems in real operational conditions.

The project presents an AI-based digital twin based on sea trial data streams. The digital twin incorporates the following elements: (I) Multi-sources data collection, (II) Bi-directional Long Short-Term Memory (Bi-LSTM) network with attention mechanisms predicting ship fuel consumption, (III)Optimal transformer neural network for ship motion analysis, and (IV) Operations optimisation. The established AI-based digital twin can monitor, analyse, and predict 6-Degree of Freedom (6-DoF) ship motion and fuel consumption. By iteratively assessing various combined operation instructions, the optimal combination of operation instructions can be determined, enhancing safety and sustainability in real operational conditions. The study demonstrates that the AI-based digital twin can help avoid critical scenarios (collision, grounding, capsizing, etc.) and reduce greenhouse gas emissions during shipping. In the long term, this project could contribute to the development of a new generation of decision support systems for enhancing safety and decarbonization in waterborne transportation.





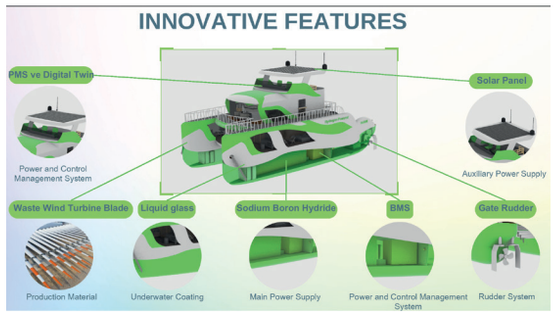
Hüseyin Enis Sarikaya, Birtane Gökce
Bandirma Onyedi Eylül University

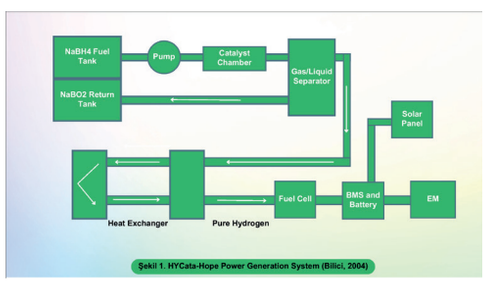
Category: **Waterborne** Country: **Türkiye**

Research Area 2: **Sustainable Mobility of People & Goods** Idea Number: **74**

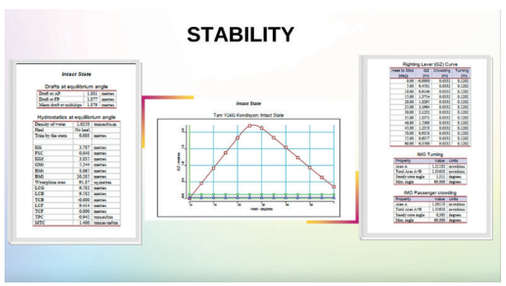
HYCata-Hope

HYCata-Hope (Powered by Hydrogen) is a zero-emission, environmentally friendly, zero-emission cruising catamaran that uses Sodium Boron Hydride as fuel and promotes the use of renewable energy sources. The Paris Agreement aims to mitigate climate change and its risks globally, and the maritime sector is expected to contribute to this goal. The Paris Agreement directs companies to new investments and research to reduce greenhouse gas emissions and reduce carbon emissions in order to keep the increase in global average temperature below 2 degrees Celsius compared to preindustrial levels and to limit the increase to 1.5 degrees Celsius as much as possible (Republic of Türkiye Ministry of Foreign Affairs, Accessed 20 July 2023). This catamaran has the potential to reduce carbon emissions and their impacts. And in these times when green energy is on the agenda, it could be a good alternative for companies..





Şekil 1. HYCata-Hope Power Generation System (Bilici, 2004)



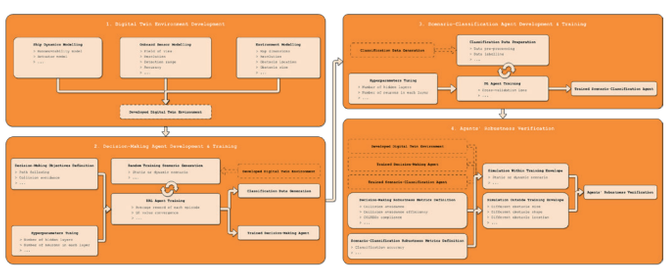
Paul Lee
University of Strathclyde

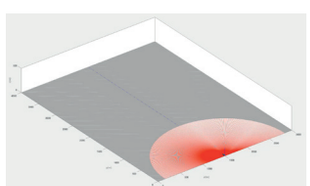
Category: **Waterborne** Country: **United Kingdom**

Research Area 3: **Efficient & Resilient Systems** Idea Number: **21**

Robust Reactive Collision Avoidance System for Autonomous Ships Amidst Limited Sensory Information and Unclassified Surface Obstacles

The recent maritime industry has been transitioning to the new era of Shipping 4.0 propelled by the vision of a more sustainable future. Autonomous ships, also known as Maritime Autonomous Surface Ships (MASSs), are envisioned to be the main ecosystems of Cyber-Physical Systems (CPSs) with the potential to unlock new levels of sustainability. However, prior to their full-scale adoption, new challenges pertaining to safety-critical operations need to be addressed, such as collision avoidance. In particular, ensuring safe and efficient collision avoidance of MASSs under uncertainties is an ever-increasing key challenge. To tackle this, a novel idea is proposed to develop a reactive collision avoidance system for MASS with robust decision-making and scenario-classification capabilities amidst limited sensory information and unclassified surface obstacles. This idea is formulated into a systematic methodology that consists of the development of a high-fidelity digital twin environment, development and training of Artificial Intelligence (AI)-based agents for decision-making and scenario-classification, and verification of the system's robustness. Simulation results verify that the decision-making agent can generate efficient, safe, and CORLEGs-compliant evasive manoeuvres even outside of the training envelope. Also, the scenario-classification agent can identify a static or dynamic scenario with accuracy above 82.8%. Finally, the developed system can handle reactive collision avoidance amidst a wide range of unclassified obstacles resembling surface obstacles with radii of 4-470 m and target vessels ranging from 12-104 m in length. This idea contributes to the future of sustainable maritime industry by paving the way for robust autonomous systems in safety-critical applications.





Dan Voiculescu
Colegiul Național "Costache Negri"

Category: **Waterborne** Country: **Romania**

Research Area 1: **Sustainable Mobility of People and Goods** Idea Number: **42**

STS Danubius Celeritas: The future of maritime transport and tourism

The STS Danubius Celeritas is not merely a means of transportation; it's an immersive experience. Equipped with state-of-the-art technology and intelligent navigation systems, it offers captivating guided tours along the enchanting Galati Danube. Passengers can embark on a journey of discovery, immersing themselves in the rich history, natural beauty, and cultural heritage of the region. With its autonomous capabilities, the STS Danubius Celeritas ensures a safe and reliable voyage, expertly navigating the river's currents and obstacles. Its advanced GPS system guarantees precise positioning and allows for smooth and swift transit, ensuring passengers reach their destinations promptly. As a result, the need for extensive personnel is minimised, making maritime travel not only efficient, but also cost-effective. With the combination of water pumps, sensors, offshore control, and the satellite-linked compass system, the STS Danubius Celeritas sets new benchmarks in safety and responsiveness. Passengers can embark on their journeys with confidence, knowing that the utmost precautions have been taken to mitigate risks and maintain the vessel's stability and security.


Especial Edition

•SERAMITAE PRESENTS•

THE DANUBE GETS MORE POLLUTED EVERY DAY!

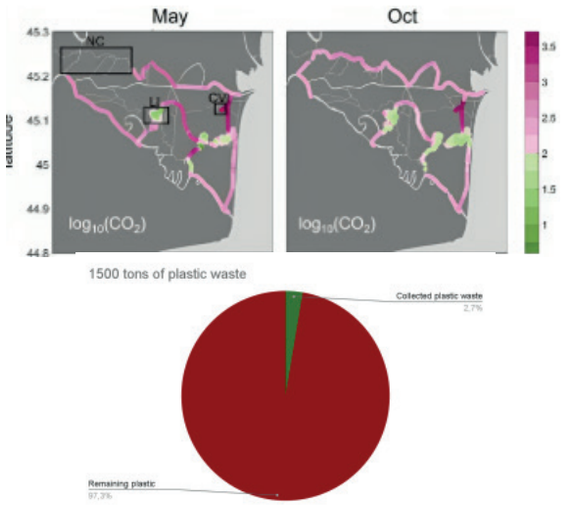
NUMBER OF PLASTIC IN OUR PRECIOUS DANUBE IS INCREASING ANUALLY AT AN ALARMING RATE!

THE FUTURE OF WATERBORNE TRANSPORT IS HERE!

STS DANUBIUS CELERITAS

The Seramitae-branded robot proposes a unique way of getting rid of the trash while providing a tour of the Danube for visitors. Equipped with a large net opening, the ship takes on wanderers and drives around the Danube strip, thus collecting every plastic bottle or residue in its way. The operation of the boat is simple, mainly due to its built-in autopilot function, only requiring offshore assistance in case of emergency. In case of such case, the sensors onboard the Danubius Celeritas alarm the "Captain", in order for him to take over the control of the ship and guide it to safety.

MORE INFORMATION ON @CLR_SERAMITAE



Fayas Malik Kanchiralla
Chalmers University of Technology

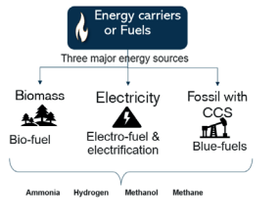
Category: **Waterborne** Country: **Sweden**

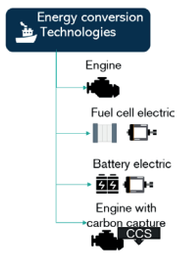
Research Area 4: **Efficient & Resilient Systems** Idea Number: **7**

A Novel Decision Support Platform for Selecting Optimal Decarbonization Strategies for Individual Ships: Integrating Life Cycle Cost and Sustainability Assessment

The maritime sector is pushing to decarbonise and lower its environmental impact. Earlier studies show that the global warming reduction potential and cost associated with different decarbonisation pathways vary with the vessel. Hence, the shipowners and shipyards must weigh environmental performance and financial considerations when deciding on a decarbonisation strategy. In this context, a system-level analysis that considers the operational, functional, and technical characteristics of the vessel is required. Each transition pathway involves modifications to the energy supply chain and propulsion system, and doing such assessment is time and resource intensive. Moreover, both cost and environmental assessment must be integrated to ensure the same system boundary and scope to identify potential environmental burdens or costs with greater clarity.

This research introduces a novel platform comprising an integrated life cycle tool that allows cost and environmental impact assessment for each vessel for selected decarbonisation pathways. This platform aims to enable ship owners and operators to make system-based decisions on choosing the decarbonisation strategy for individual ships. The tools calculate the life cycle greenhouse gas emissions, other environmental impacts, and the cost of different pathways based on the vessel's operational, functional, and technical profile. The platform covers pathways based on e-fuels based on hydrogen, blue fuels based on blue hydrogen, and direct electrification. The platform output includes the calculation of carbon abatement costs and other environmental benefits, allowing relative comparison between these pathways and the fossil-based pathways. This enables stakeholders to make an informed decision based on the effect of different future environmental regulations.





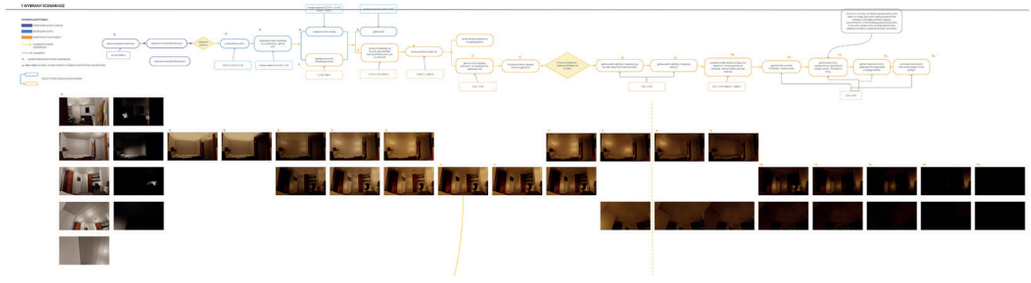
Gabriela Zemlis
Academy of Fine Arts in Gdansk

Category: **Waterborne** Country: **Poland**

Research Area 1: **Safe & Inclusive Transport** Idea Number: **41**

Sleepy – System to help take care of peri-sleep hygiene with a particular focus on shift workers

Sleepy is designed to aid sleep in maritime environments, where the quality of sleep for crews is important for safety. Furthermore, it draws attention to the fact that good sleep hygiene - at sea as well as on land - is the basis for building physical, mental and emotional stability in a person's life.This research is an attempt to answer to a problem affecting a small but, due to extremely harsh - shipboard - living conditions, a special group of users. Because of the work organisation that is the watch system, they may neglect the basic, physiological need for sleep. Sleepy aims to induce a sleep-conditioning stimulus by changing the perception of the cabin interior from a harsh, ship-like environment to a more homely, private, cosy one. The system models the cabin interior with time-varying lighting that gradually fades out and changes intensity and colour temperature to guide the user towards their berth. It is a reference to natural processes occurring in nature. The system is designed as a personal object realised by two electronic emitters. It is portable, suitable for use in a ship's cabin as well as a living space on land. As a permanent element in the peri-sleep time ritual, it can help to regulate disturbed natural diurnal rhythms - essential for maintaining life's balance. It can also be useful for people struggling with sleep deprivation who, under pressure to be constantly productive, find it difficult to maintain basic sleep hygiene.



Beata Mielus
Academy of Fine Arts in Gdansk

Category: **Waterborne** Country: **Poland**

Research Area 4: **Collaborative Digitalisation** Idea Number: **46**

Unmanned surface vehicle for offshore wind farms diagnostics

Offshore wind energy is a zero-emission renewable energy technology. Both wind farms and wind turbines are becoming larger in size. The average lifespan of such a turbine is 25 years. However, to ensure it can operate for that long, it requires proper diagnostics (at least twice a year) and adequate maintenance. The turbine's condition is mainly affected by damages resulting from wear and tear and weather conditions. To provide a cheaper, faster, and safer way that does not endanger human lives, drones have been increasingly used for the inspection of wind farms. However, such inspections are not always possible, as they require suitable weather conditions. Wind turbines themselves also do not operate all year round. The turbine blades are shut down when the wind speed is below 3 m/s or above 25 m/s with the most optimal wind speed being 12 m/s (Beaufort 6).

To tackle the diagnostics of offshore wind farms, this research introduces a watercraft allowing for autonomous navigation, which with the help of flying drones performs diagnostics of both the rotor blades and the windmill tower itself. The concept will facilitate operations that are much more complicated in the seas and oceans. The designed electric platform will be both a landing pad for flying drones and a place where these drones recharge their batteries. Diagnostics at sea are much more complicated than on land, which led to the idea of designing a Diagnostic - Unmanned Surface Vehicle (D-USV), an unmanned watercraft that would facilitate this task.

Wave Energy Conversion

Ivan Baš
University of Zagreb, Faculty of Mechanical Engineering and Naval Architecture

Croatia

Waterborne RA4

TRANSPORT MODE

AIRBORNE

1

WINNER

Marina Perez Navarro
Universidad Politécnica de Madrid

Category: **Airborne**

Country: **Spain**

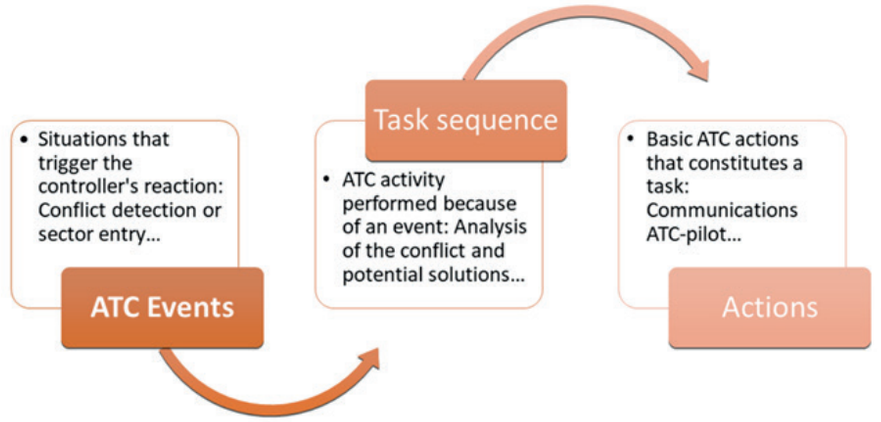
Research Area 3: **Efficient & Resilient Systems**

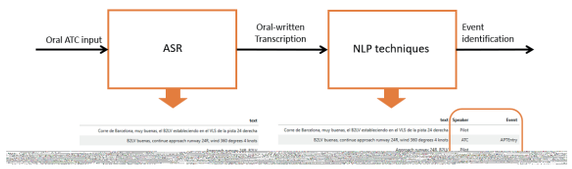
Idea Number: **33**

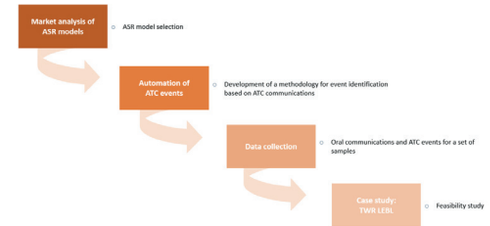
WINNER

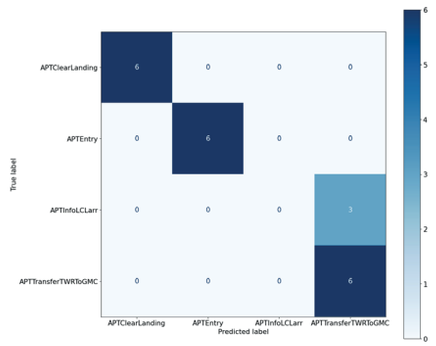
Event-based identification approach for Air Traffic Control workload based on Natural Language Processing techniques

Air Traffic demand is constantly increasing and pushing the limits of the current air traffic management system. One of the main bottlenecks for potential demand is capacity. Capacity is directly related to Air Traffic Control (ATC) workload. Currently, ENAIRE (Spanish Air Navigation Service Provider) has developed the SCOPE model to quantify ATC workload from the analysis of controller actions, triggered by situations or events that require the controller's intervention. However, this correlation between communications and associated ATC events is performed manually by engineers who perform an analysis of ATC communications based on continuous oral listening. Typically, an hour of ATC transcription demands six to ten hours of human work. Natural Language Processing (NLP) is a branch of Artificial Intelligence that extracts information from oral or written sources. Therefore, the aim of this research is to analyse the feasibility of automating this process based on NLP techniques. Besides, this work is developed in coordination with ENAIRE. The approach focuses on the identification of events from the ATC's oral transcript and determines whether it is feasible to use ATC communications as a data source for ATC workload models. This is a two-step approach: 1) Automatic Speech Recognition (ASR) models automatically transcript oral communications and; 2) NLP techniques focussing on classification techniques allow to identify ATC events. Therefore, the main expected benefit is the process automation based on NLP techniques to drastically reduce the human intervention on the ATC workload measurement process.









Whisper
- It struggles when used in ATC environment
- Event transcription is promising

NLP techniques
- High results
- Potential initial approach to event identification

2

SECOND PRIZE

Arinc Tutku Altun, Hasan Karali
Cranfield University

Category: **Airborne**

Country: **United Kingdom**

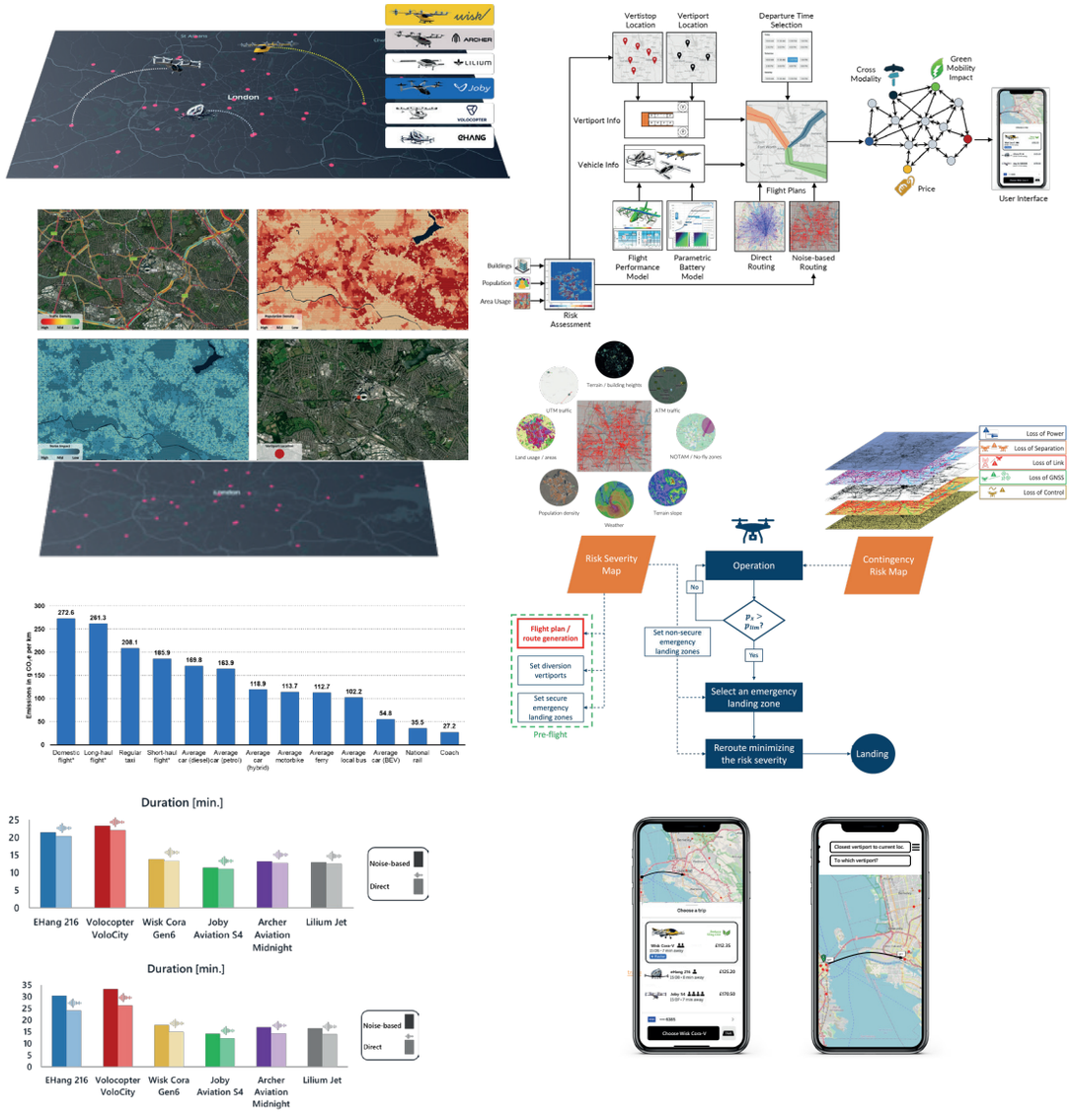
Research Area 2: **Sustainable Mobility of People & Goods**

Idea Number: **49**

SECOND PRIZE

Pricing Study for Advanced Air Mobility Trips based on Route & Vehicle Selection, Flight Performance Analysis, and Environmental Impact

Future Advanced Air Mobility (AAM) is a system that aims to transform the current air transportation system into a more agile, flexible, and accessible system. Yet, the considered transformation is not easy to achieve, since it involves providing safety, as well as efficiency to different stakeholders. For analysing the feasibility of such a concept, especially from the passengers' perspective, this research explores what should be the pricing strategies depending on various aspects, such as routing options, vehicle energy management, departure time sensitivity of the passengers, and environmental impact. As routing options, the study considers direct and noise-based routing which is derived through risk assessment considering population density, buildings, and area usage. Performance and energy management for the AAM vehicles will be provided based on detailed flight performance modelling and parametric battery modelling. Also, the relevant cost analysis will be conducted based on the vehicles' battery and location availability and feasibility. Furthermore, an extensive pricing strategy will be studied by combining the outputs of all those models and including the departure time sensitivity of passengers. In addition to the pricing study, the environmental impact of the AAM system compared to ground transportation will be analysed, and relevant cross-modality options will be evaluated. Finally, an interface will be explored consisting of the prices of the selected vehicle and route combinations, alternative options, and the environmental impact comparisons with other modes of transportation. The mentioned interface is expected to be utilised directly by future AAM passengers.



3

THIRD PRIZE

Sara Molinari
"La Sapienza" University of Rome

Category: **Airborne**

Country: **: Italy**

Research Area 2: **Sustainable Mobility of People & Goods**

Idea Number: **67**

THIRD PRIZE

Enhancing Ground Risk Mitigations with SFactor: Route Planning Based on Shelter Factor for Urban Blood Sample Drone Delivery

This project aims to develop a software solution for planning drone routes to transport blood samples between hospitals in urban settings, minimising risks for people on the ground. Given the growing adoption of Unmanned Aircraft Systems (UASs) especially in the medical field, the project addresses the specific case of blood sample transport between two hospitals in the Helsinki urban area. Compliance with aviation regulations is crucial. Therefore, the project adopts the Specific Operation Risk Assessment (SORA) methodology to conduct the risk analysis, particularly using the newer SORA 2.5 version. The assessment indicates a significant risk for individuals on the ground, persisting despite the implementation of the M1(A) mitigation at Low Level of Robustness and the M2 mitigation at Medium Level of Robustness, which makes the operation unfeasible. To overcome this challenge, the project introduces "SFactor", a software that enhances the determination of the drone flight trajectory based on the Shelter Factor. By leveraging building data from the European Settlement Map (Copernicus project), SFactor optimises drone trajectories, directing flights over buildings to maximise sheltered areas. This approach effectively reduces the number of individuals exposed to risk, enabling the application of the M1(A) mitigation at a Medium Level of Robustness. In this way, these critical operations are feasible, ensuring the safe and timely transport of blood samples via drones between hospitals. This innovative solution not only leverages cutting-edge technology but also aligns with the imperative to safeguard human lives while harnessing the potential of UASs in the healthcare sector.

In medicines drones are used for the transport of:

- **MEDICAL EQUIPMENT**
- **MEDICINES, DRUGS and ANTIVENOM**
- **BIOLOGICAL SAMPLES**
- **BLOOD SAMPLES**
- **ORGANS**
- **LIFESAVING EQUIPMENT (e.g., DEFIBRILLATORS)**
- **COVID TESTS**

WHY ARE DRONES USED IN THE MEDICAL FIELD?

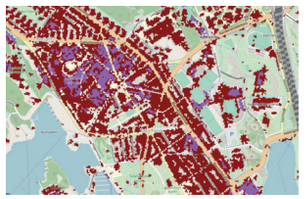
Because they are:

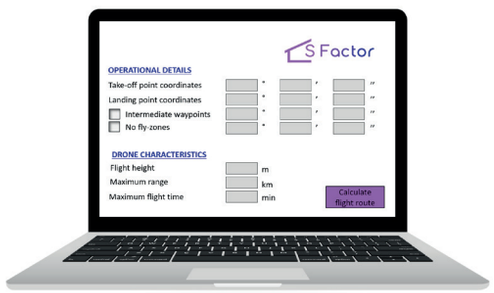
- Versatile
- Fast, reduced delivery time
- Not subject to traffic jams
- Cheap in the long run
- No need of ad hoc infrastructures
- Low emissions

Intrinsic UAS Ground Risk Class						
Max UA characteristics dimension		1 m	3 m	8 m	20 m	40 m
Max cruise speed		*25 m/s*	*35 m/s*	*75 m/s*	*150 m/s*	*200 m/s*
Maximum iGRC population density (ppl/km²)	Controlled ground area	1	2	3	4	5
	< 25	3	4	5	6	7
	< 250	4	5	6	7	8
	< 2,500	5	6	7	8	9
	< 25,000	6	7	8	9	10
	< 250,000	7	8	9	10	11
	> 250,000	7	9	Category C Operations (Not part of SORA)		

	Level of robustness		
Mitigations for ground risk	Low	Medium	High
M1(A) – Strategic mitigations for ground risk	-1	-2	-3
M1(B) – Visual Line of Sight (VLOS) – avoid flying over people	-1	N/A	N/A
M2 – Effects of UA impact dynamics are reduced	0	-1	-2/-3

SAIL Determination				
	Residual ARC			
Final GRC	a	b	c	d
≤2	I	II	IV	VI
3	II	II	IV	VI
4	III	III	IV	VI
5	IV	IV	IV	VI
6	V	V	V	VI
7	VI	VI	VI	VI
>7	Category C operation			





Jonas Füllgraf
Technical University Braunschweig

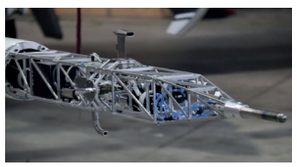
Category: **Airborne** Country: **Germany**

Research Area 2: **Sustainable Mobility of People & Goods** Idea Number: **04**

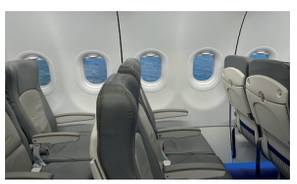
Integrating Fixed Flight-Path Angle Approaches in the European air transport operation

Aircraft descents are frequently interrupted, especially in complex airspaces and with high traffic volumes. In these cases, the affected aircraft performs several horizontal flight phases at altitudes lower than the cruising altitude. Due to the higher pressure at lower altitudes and the associated increased drag, these horizontal flight phases are less efficient than cruise altitude flight. To counteract this, so-called Continuous Descent Approaches (CDA) were introduced. This procedure is also known as Continuous Descent Operation (CDO). During such an approach, the aircraft performs a continuous idle descent without horizontal flight phases. However, the disadvantages of this method are that it is difficult to predict and very susceptible to wind. This is the reason that CDO is used typically at off-peak times. In research, the fixed-flight path angle approach (FPA) has been discussed for several years. This is also a continuous descent, but with a fixed geometric angle. The engines do not idle and the angle is typically flatter than in CDO. Research to date has examined individual trajectories and demonstrated that current generations of aircraft are capable of flying FPAs. The next step is a review of the concept, taking into account the traffic situation and the airspace structure. Central Europe in particular is interesting for consideration due to the complex airspaces. This work aims to evaluate whether FPA can be integrated into European airspace to reduce emissions.

Drag Probe HELIPOD



Research Aircraft Cessna F406 „D-ILAB“ and Nose Boom



Research Simulators DA42 and CETRAS

Gabriele Sirtori
Politecnico di Milano

Category: **Airborne** Country: **Italy**

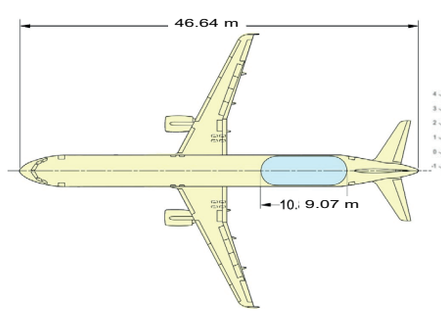
Research Area 2: **Sustainable Mobility of People & Goods** Idea Number: **29**

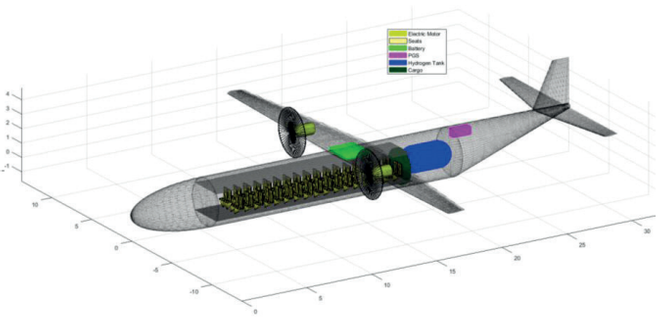
Introduction of hydrogen-powered aircraft: technological challenges and environmental benefits

Commercial aviation needs to reduce its impact on climate, contributing to the general effort required to achieve the Paris Agreement targets. An important contribution to this task can come with the introduction of hydrogen-powered aircraft. This project is an overall analysis concerning the development of hydrogen-powered aircraft, covering:

- the preliminary sizing of innovative aircraft, accounting for the specificities linked to the integration of hydrogen and its tank onboard;
- an assessment of the environmental benefits liked to the operations of these innovative planes, with a distinction between regional aircraft, whose power comes from fuel cells, and jet aircraft, that are powered via the direct combustion of hydrogen;
- an assessment of the cost of operating a hydrogen production plant in situ aiming to support a specific flight schedule.

These tasks can help identify ways that mitigate the negative impacts of the integration of hydrogen tanks within the fuselage, while satisfying the market demand in terms of aircraft performance. An example of this is given by the results of the preliminary sizing of a hydrogen-burning jet aircraft based on the TLARs of the A320NEO: the design range has been reduced from 4500 km to 2850 km, obtaining an aircraft capable of flying 75% of current narrow-body missions, with a 7.5% RWE gain on the reference mission of 1600 km. The RWE is still worse compared to that of the conventional aircraft, but there are zero CO2 emissions at aircraft level.





Chris Gurjao
AlmaMater University of Bologna

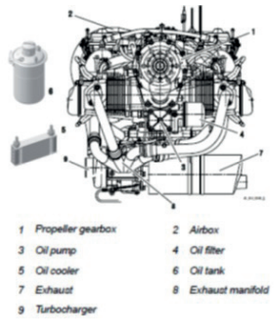
Category: **Airborne** Country: **Italy**

Research Area 2: **Sustainable Mobility of People & Goods** Idea Number: **66**

Unmanned Aerial Service (UAS) Delivery Vehicle "FastDrop"

There has been a serious interest in the autonomous aerial delivery of supplies and commodities in recent times. Several commercial and governmental organisations have been developing and testing vehicles of various sizes and capabilities in order to meet various supply chain needs, such as point-to-point delivery of shipments. The COVID-19 pandemic and the subsequent lockdowns intensified the need for rapid autonomous delivery of essential goods (food, medicine, etc.) to individuals and organisations in densely-populated urban high-rise buildings. Among the many impacts to daily life, the pandemic forced a re-evaluation of the existing logistical methods by which essential supplies are distributed within large communities or between different communities, especially when a lockdown is being enforced.

Vertical lift technology can assist societies worldwide through the safe distribution of medical supplies and other commodities by means of human-independent 'contactless' delivery in areas without a runway. The other functions of a completely autonomous aerial delivery vehicle include disaster relief and various commercial purposes. This project describes the design of an Unmanned Aerial System (UAS), named the FastDrop. The mission of this Vertical Take-off and Landing (VTOL) aircraft is to transport a 50 kg payload to end-user customer sites of maximum 50 km radius away, over a specified mission profile, subject to various constraints. The design utilises only technologies having sufficiently high Technological Readiness Level (TRL), in addition to current commercial availability in the Aerospace and Defense marketplace, in order to support an initial entry into service by the year 2025.



Sergiu Nistor, Alin Pepelea, Stefan Poterasu, Victor Puia
Colegiul National Costache Negri

Category: **Airborne** Country: **Romania**

Research Area 2: **Sustainable Mobility of People & Goods** Idea Number: **10**

Seramiwing: Revolutionising Airborne Letter and Package Delivery

In the realm of robotics, innovation is boundless. The Seramiwing project seeks to revolutionise letter and document delivery with an airborne robot named Swing. This fixed-wing, aeroplane-inspired robot promises swift, reliable, and efficient delivery services. Seramiwing's sleek design, crafted from lightweight yet sturdy materials, optimises lift and manoeuvrability while minimising energy consumption. Its electric propulsion system and rechargeable batteries enable long-distance flights without refuelling. Equipped with an onboard navigation system, Seramiwing autonomously plans routes, adapting to changing weather conditions and avoiding obstacles. The primary goal is to streamline delivery, reducing human effort and transportation costs. Seramiwing utilises an innovative cargo bay system, ensuring the secure transport of various packages. Unlike other delivery drones, it doesn't fly directly to customers' houses, but instead lands at city centres, where traditional delivery personnel equipped with electric trucks distribute the parcels. This approach saves jobs while offering faster and greener delivery options. Seramiwing's implementation offers numerous advantages over conventional methods. Its air routes significantly reduce transit time, crucial for time-sensitive documents. Environmentally, Seramiwing stands out with its electric propulsion system, contributing to reduced greenhouse gas emissions. Encouraging robotics adoption in logistics can mitigate the carbon footprint of traditional transportation methods. Seramiwing represents a significant leap in delivery services, combining advanced technology, innovative design, and autonomous functionality. Its swiftness, reliability, and eco-friendliness promise a new era of efficient and timely deliveries.

YOUNG RESEARCHERS

TRANSPORT MODE

CROSSMODALITY

1

WINNER
ex aequo

Maurice Krauth, Matthias Ribesmeier
Technische Universität Dresden

Category: **Crossmodality**

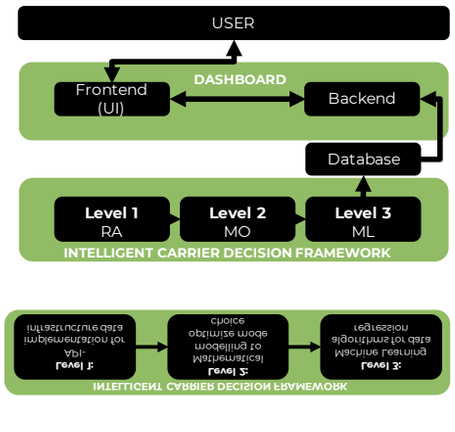
Country: **Germany**

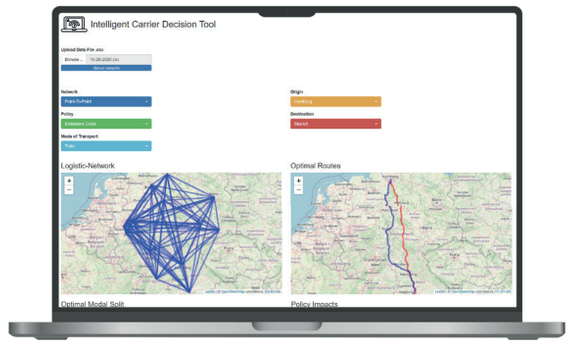
Research Area 2: **Sustainable Mobility of People & Goods**

Idea Number: **33**

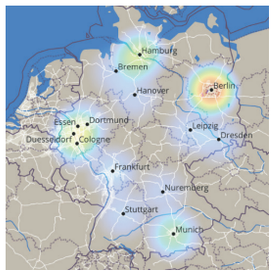
WINNER
ex aequo

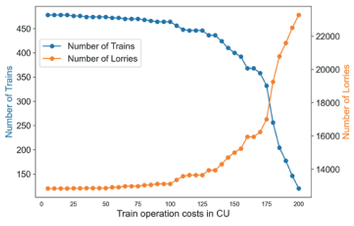
Intelligent Carrier Decision Framework for Sustainable Intermodal Delivery Service

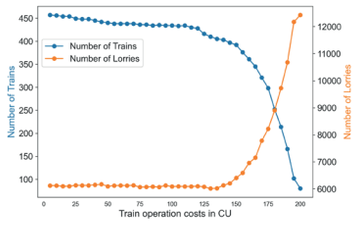


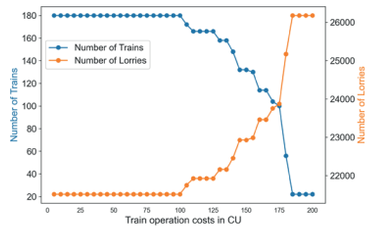


In the last 10 years, the volume of deliveries in the courier, express and parcel service industry in Germany has doubled to 4 billion units per year. These deliveries are mainly transported by fossil-fueled road transport. The increased volume is causing rising strain on city infrastructures, and has gained significant public and research concerns. Considering the main objectives of urban logistics stakeholders, a potential shift to rail in order to reduce congestion and emissions needs to be explored. In this research, the problem of optimal sustainable mode choice for parcel delivery networks is investigated. The project developed an Intelligent Decision Framework (ICDF) to assist carriers in economically and sustainably shifting goods from road to rail. A network flow model is developed which minimises induced costs by deciding preferred mode between the inner-city hubs in a bi-modal freight network. Transport policies such as tolls and reducing energy consumption are implemented. Different objectives of city logistic stakeholders are also considered. Additionally, a Dashboard was developed, and together with ICDF, it was implemented as a new webtool. The research demonstrates the model performance on a German parcel network and shows an in-depth analysis that allows carriers to choose the optimal modal split considering several transport policies. The webtool is highly flexible, as it allows varying multiple parameters. The ICDF webtool enables carriers evaluating the impact of predefined freight policies on mode choice for parcel delivery networks, as well as to which extent and under which conditions rail freight traffic can be economically beneficial.









1

WINNER
ex aequo

Ejiro Ikoko
University of Leeds

Category: **Crossmodality**

Country: **United Kingdom**

Research Area 2: **Sustainable Mobility of People & Goods**

Idea Number: **76**

WINNER
ex aequo

Mobility as a Service (MaaS) for women and goods travelling in Sub-Saharan Africa. A case study of Isolo in Lagos, Nigeria

In Sub-Saharan Africa, women in the low and middle classes mostly rely on public transport and walking. These women experience travel challenges, such as unaffordability of fares, safety issues, mainly door-to-door movement of their goods, etc. These challenges make travel difficult, leading to restricted mobility, which affects their well-being. MaaS is said to be an innovative mobility solution that is focused on the users' needs. MaaS is a system that seeks to provide access to various combinations of transport modes and a single payment through the unifying platform. This study aims to co-design a MaaS that fits into everyday life, for the movement of women and goods. This qualitative research uses participatory and creative methods. Participants (women) were involved in a co-design workshop, using creative tools such as mapping, photographs, role-playing, etc., to generate ideas on how MaaS can be designed for women and goods movement. Then, the data produced from the workshops was analysed by semiotic and thematic analysis. The findings from the analysis of the data generated from the workshop are expected to provide insights that will facilitate the integrated movement of women and goods in Lagos, Nigeria. Also, the findings will benefit Transport planners, policymakers, and MaaS adopters interested in similar African cities. This research is highly relevant to the theme as this study aims to achieve sustainable mobility of people (women) and goods.

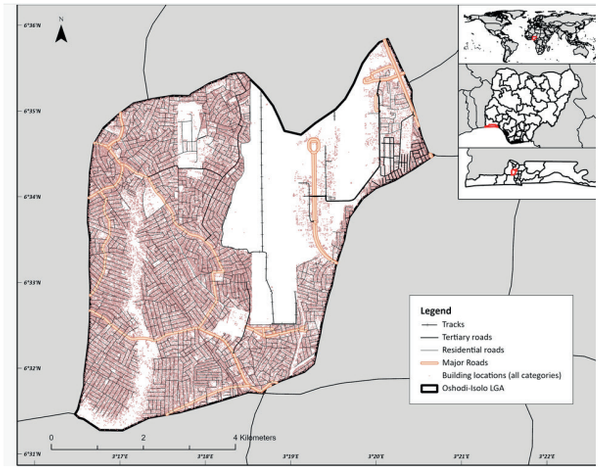
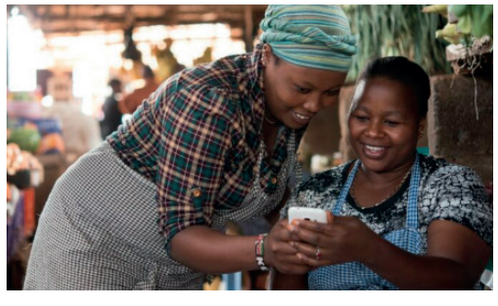


Figure 1: A Map of the Isolo in Lagos, highlighted in the world Map (GADM maps and data, 2023)



3

THIRD PRIZE

Rita Prior Filipe
University of Bath

Category: **Crossmodality**

Country: **United Kingdom**

Research Area 2: **Sustainable Mobility of People & Goods**

Idea Number: **02**

THIRD PRIZE

Assessing the Feasibility of Regional MaaS

Mobility as a Service (MaaS) aims at integrating multiple transport modes into a single mobility service accessible on demand. This is expected to improve mobility with a direct impact on the increase in modal share of more environmentally friendly and efficient mobility options, while reducing the use of privately owned vehicles, and indirect links to improving transport accessibility and stakeholder cooperation and collaboration. MaaS requires wide adoption to generate effective economic, social, and environmental results, hence why urban areas are usually chosen for the implementation of this service. However, the notable challenges experienced in suburban and rural transport should be acknowledged, as the accessibility disparities in these areas contribute towards a lack of job opportunities and reducing social independence.

A significant barrier experienced in these areas is the absence of a regional integrated transport system. Therefore, the current research aims to address this challenge by examining the potential for a regional MaaS to reinforce the existing transport network of two local authorities in the United Kingdom: Bath, North East Somerset and Bristol. The first objective is to characterise the current transport system through several dimensions, considering literature-informed stakeholder priorities for the mobility sector (Figure 1). The following goals comprise formulating feasible MaaS adoption scenarios to be tested in the geographically designed regional transport system (Figure 2), with the outcome of obtaining the impacts different MaaS uptake levels will produce on a regional mobility system reflecting on the different stakeholder priorities.

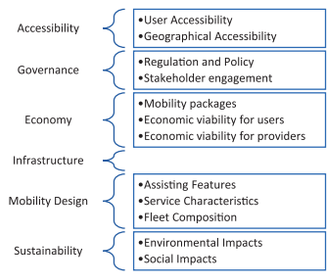


Figure 1 - Stakeholder priorities for the mobility sector

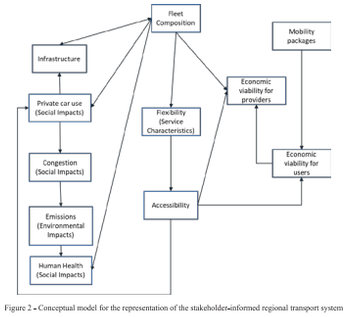
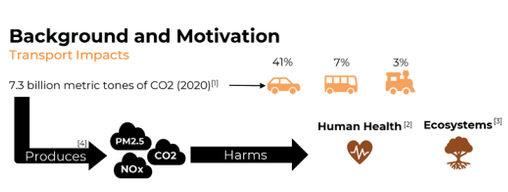
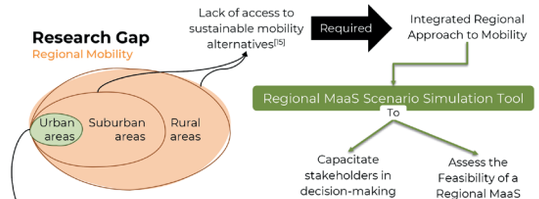
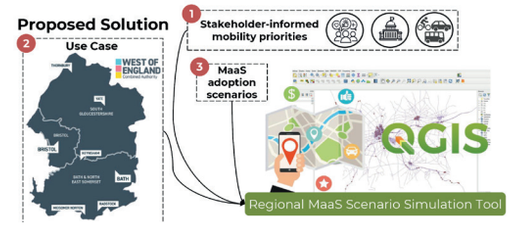
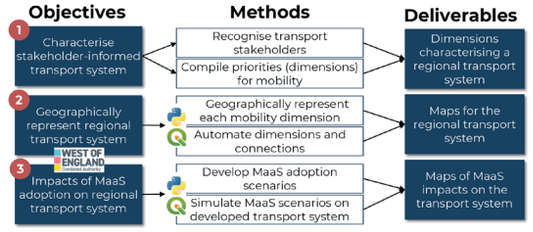


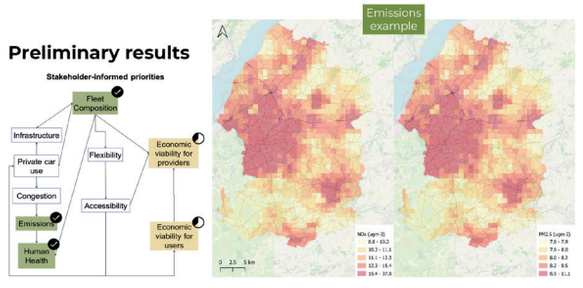
Figure 2 - Conceptual model for the representation of the stakeholder-informed regional transport system

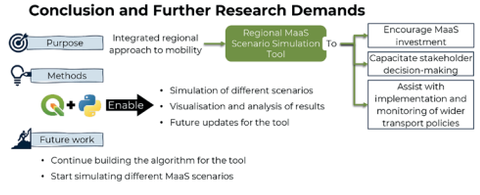












Runhao Zhou
Technische Universität Dresden

Category: **Crossmodality** Country: **Germany**

Research Area 2: **Sustainable Mobility of People & Goods** Idea Number: **72**

Deep Reinforcement Learning for Multimodal Urban Traffic Signal Control Using Traffic Surveillance Video Data

Metropolitan areas are witnessing a rise in diverse mobility options, but delays and congestion pose challenges to economic and sustainable growth. One approach to address these issues is an intelligent traffic signal control system. Recent advancements in hardware and computational power enable the development of high-performance signal control systems. This research utilises Deep Reinforcement Learning (DRL) to control traffic signals at multimodal intersections, allowing the responses to rapid traffic changes, optimisation of electric energy supply, and protection of pedestrians and cyclists. The state space of DRL not only involves information of motorised road users, but also that of pedestrians and cyclists to help agents in decision-making. The positional information of pedestrians and cyclists is derived from traffic surveillance videos. Finally, the simulation analyses indicate that the proposed framework significantly reduces travel delay, while ensuring safe crossing, green time for pedestrians and cyclists. This research contributes to a study framework for understanding the learning-based technology in urban multimodal traffic signal control. Moreover, a highlight is the implementation of the proposed framework at an actual urban intersection after validation in the simulation. Camera, V2X equipment, an MQTT databroker for data communication, and the proposed framework will be deployed in a real city. It may effectively support the formulation and development of signal control guidelines, strategies and operations, thereby improving crossing efficiency and advancing smart city strategies.

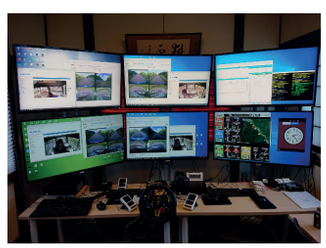
Sunil Basnet, Meriam Chaal
Aalto University

Category: **Crossmodality** Country: **Finland**

Research Area 1: **Safe & Inclusive Transport** Idea Number: **40**

A tool for risk monitoring of vehicle remote operation

This study introduces a dynamic Bayesian network (BN)-based tool designed for continuous operational risk assessment and monitoring of vehicle remote operation, emphasising its potential applicability across diverse transportation sectors equipped with incident databases. Motivated by the relatively limited studies to operational risk monitoring in the context of future autonomous and remotely operated vehicles, tthis research highlights the significance of such tools and their invaluable utility in constructing and perpetually updating risk models based on real-time incident data.
The approach combines a suite of tools, encompassing a user-friendly Graphical User Interface (GUI), a versatile programming language, specialised BN packages, and diagramming software, ultimately automating the development of BN risk models. To mitigate computational complexities associated with large BN models, the methodology employs Noisy-OR gates.
The study outlines a five-step methodology, culminating in the creation of the proposed tool, with each step dedicated to a specific task: data extraction, probability calculation, BN modelling, generating inference, and GUI and visualisations. To execute these steps, a programming script is developed, which automates the methodology, enabling real-time BN development and continuous risk monitoring. The script operates in the background at specified intervals, ensuring that risk event visualisations remain up-to-date. The methodology has been demonstrated in the study by developing a risk monitoring tool for ship remote pilotage operation.



Assemgul Kozhabek
Bournemouth University

Category: **Crossmodality** Country: **United Kingdom**

Research Area 4: **Collaborative Digitalisation** Idea Number: **54**

Transportation Capacity Planning for Mega-events

This project argues that transport capacity planning has similarities across host cities of the mega-events, because there is always a need to handle mega-event's peak passenger demands. On the contrary, previous research believes that infrastructural solutions are place-specific. However, some transport capacity planning approaches are not city-specific, and there actually exist similarities in transport among the underlyingly different mega-events, such as Summer Olympic Games and World Expo. Therefore, this project develops recommendations based on comparative enquiry to leverage existing knowledge for peak demand transport.

Based on the previous practices on transportation planning and management, which has famously been labelled by Horne (2007) as "known unknowns" of Olympic host cities and modern innovative transport solutions, the research sets recommendations on transport capacity planning. The cross comparative research would provide a basis for new ideas, awareness of potential risks and indicators for successful applications. The research considers different transportation modes and cross-modal use, further enhancing the understanding of transportation challenges and solutions for mega-events.

Sevket Oguz Kagan Capkin, Francesca Damiani
La Sapienza Università di Roma

Category: **Crossmodality** Country: **Italy**

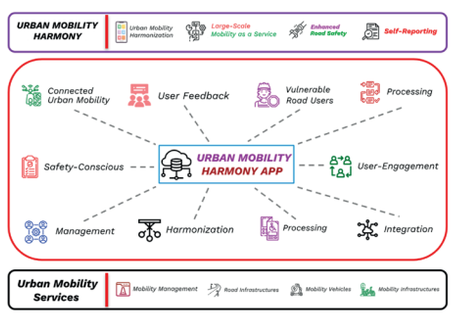
Research Area 2: **Sustainable Mobility of People & Goods** Idea Number: **35**

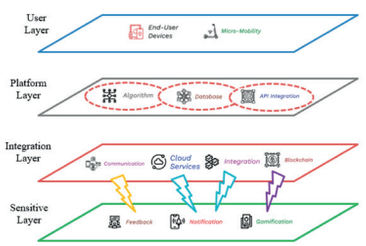
Promoting Safe and Sustainable Urban Mobility: A Micro-Mobility Mobile App for Safety, Integration, and Cooperation

This research introduces a micro-mobility mobile application designed to address challenges and promote safety, integration, and cooperation in urban settings. This comprehensive platform connects users, micro-mobility service providers, and local authorities, enabling effective communication and collaboration among stakeholders. Safety features include real-time navigation with optimised routes for micro-mobility vehicles and reminders for helmet usage and traffic regulations, enhancing user awareness and adherence to best practices.

Integration is a key focus of the mobile app, which seamlessly integrates multiple micro-mobility service providers. Users can access a diverse range of vehicles through a single platform, streamlining their experience and providing a unified payment system for convenience. Additionally, the app facilitates smooth integration with existing public transportation networks, enabling users to plan multi-modal trips and fostering a connected transportation ecosystem. Cooperation is essential for successful micro-mobility implementation, and the app actively promotes collaborative actions. It facilitates communication channels between users, service providers, and local authorities, allowing for swift reporting and resolution of issues such as damaged vehicles, traffic violations, or parking irregularities. By encouraging cooperation, the app aims to foster a harmonious relationship between micro-mobility users, service providers, and the wider urban community.

This micro-mobility mobile app represents an innovative solution to urban mobility challenges, enhancing safety, integration, and cooperation. Further research is needed to assess its effectiveness and explore opportunities for improvement in micro-mobility integration and cooperation within urban environments.





Siti Fariya
University of Kent

Category: **Crossmodality** Country: **United Kingdom**

Research Area 3: **Efficient & Resilient Systems** Idea Number: **27**

AI-Driven Port Traffic Modelling and Simulation for Improved Efficiency

This project employs an innovative approach to analyse port traffic flow for intermodal systems by integrating Artificial Intelligence (AI) with modelling and simulation techniques. At the intersection of growing maritime transport demand and complex port operations, achieving efficiency and reducing congestion is critical. The project's methodology integrates AI with simulation software and ANPR-enabled tracking. AI is able to support decision-making by automating processes, enabling real-time data analysis, and predictive modelling. For example, AI focuses on operations such as loading, unloading, and check-in at the port, and Machine Learning algorithms predict traffic patterns from historical and real-time data. By incorporating AI and digital technologies, a practical strategy to alleviate port congestion is provided, improving throughput.

The project proposes developing an intermodal simulation model for safe, controlled testing alongside AI interventions. At the current stage, there is still much to comprehend about the interaction of these complex systems in real-world applications. This study introduces a clearly defined conceptual framework and conducts a thorough feasibility analysis to understand better the practicality of such an approach considering various elements like costs, technical requirements, and real-world application. Thus, this research pushes the AI application frontiers in maritime logistics, signalling a transformative potential for more intelligent, efficient, and sustainable port operations in the digitalisation era.

Meng Cai, Niklas Suhre
Technical University of Darmstadt

Category: **Crossmodality** Country: **Germany**

Research Area 1: **Safe & Inclusive Transport** Idea Number: **61**

Co-Designing Resilient Future Mobility in Virtual Reality

The future of mobility must be resilient and inclusive. Achieving this requires not only innovative technologies, but also community-centred solutions. This research proposes a novel approach for cross-modal transportation planning - simulating extreme events in a virtual city to allow diverse populations to experience and co-design a resilient future mobility system.

In this pilot project, a blocked traffic scenario into a virtual urban environment was developed and integrated. Then, four participants who have expertise in structural engineering, traffic and transport, spatial engineering, and computer science, respectively, werre invited to engage in this virtual environment and experience the integrated scenario. Thereafter, these participants were interviewed to solicit their input regarding resilient transportation infrastructures.

Findings include that the concept of collaboratively designing resilient future mobility in a virtual environment is indeed feasible. However, significant challenges remain. These include the ethical inclusion of disadvantaged populations, addressing differences in perception and behaviour between the real world and virtual environments, and developing effective measures to verify that findings derived from virtual environments are still valid in real-world environments. The project contributes to the growing discussion of inclusive transport by introducing an innovative approach to transportation planning through virtual simulations and providing a platform for engaging diverse populations in co-designing resilient future mobility.

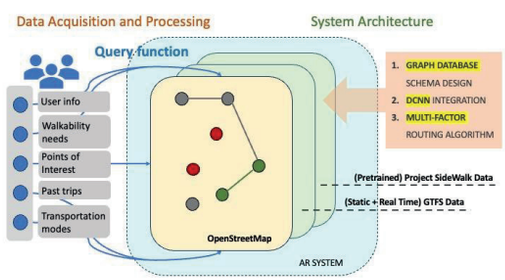
Francesco Maria Turno
Transport and Telecommunication Institute

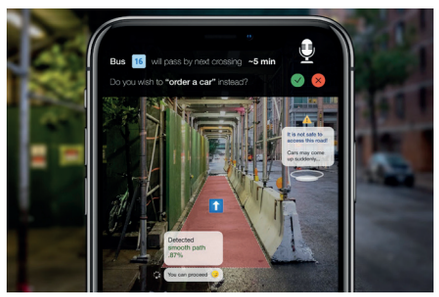
Category: **Crossmodality** Country: **Latvia**

Research Area 1: **Safe & Inclusive Transport** Idea Number: **16**

Adaptive Navigation System for Wheelchair Users in Urban Environments

Social inclusion targets various factors like age, gender, disability, ethnicity, and economic status. Yet, urban landscapes often pose significant challenges for those with mobility impairments. To bridge this gap, this research proposes an adaptive navigation system tailored for wheelchair users, with a focus on enhancing urban "walkability."
The envisioned system incorporates several key features to facilitate safe and accessible navigation. Real-time user orientation, continuous instructions, and adaptable actions ensure seamless interaction and aid in overcoming obstacles encountered during travel. Additionally, the system integrates user preferences, such as desired destinations and points of interest, allowing for personalised route planning.
Despite notable advancements in navigation technology, outdoor implementation remains relatively underexplored. Thus, this research adopts a human-centric approach, considering users' input and perceptions to assess walkability. Through a comprehensive evaluation of essential criteria like pleasurability, comfort, safety, accessibility, and feasibility, the system aims to provide tailored navigation solutions that meet users' specific needs. Moreover, the system leverages real-time data integration, incorporating factors, like weather conditions and live traffic updates to optimise route planning. Visual aids, such as interactive maps and street view functionalities, empower users to make informed decisions about their travel routes.
Furthermore, the inclusion of a user feedback feature facilitates system's refinement and improvement, ensuring its responsiveness to changing user requirements and expectations. Ultimately, through the integration of Deep Learning techniques, real-time data integration, and User Engagement, this navigation system holds the potential to enhance the mobility and inclusivity of wheelchair users in urban settings, fostering a more accessible and inclusive society.





Improving bike-train intermodality through the development and application of an accessibility indicator

Annalisa Zoli, Margherita Pazzini
Alma Mater Studiorum Università di Bologna

Italy

Cross-Modality RA1

SENIOR RESEARCHER COMPETITION

The concept behind the Senior Researchers Competition is to have an award celebrating excellence in transport related research. It is open for leading transport researchers engaged with EU-funded projects who can demonstrate proven impacts in their field.
The competition provides a platform to disseminate knowledge and results from innovation and/or research projects in Transport, promoting future synergies and further development of pioneering ideas, in line with the strategic objectives of the TRA stakeholders.

The Senior Researchers Competition acts as a showcase for some of the best EU-funded innovation and research, and encourages the identification of current and future leaders in their field. The competition was promoted through the stakeholders in the consortium, through national contact points and through targeted contact coordinators and participants in EU-funded transport projects. Participants could register for the competition either directly via the TRA VISIONS website or via the TRA 2022 conference entry portal. From this 2024 edition, the authors of the papers submitted to the TRA Conference 2024 were also inducted into the Senior Researcher Competition.

The evaluation was a three-stage process. Firstly, all entries were reviewed for content, eligibility, and relevance to produce a long list. All entries which were selected for the long list were then invited to submit additional information, an impact statement about their research and a brief CV. These submissions were assessed by at least two independent, subject expert evaluators against the following selection criteria: (i) amount and proportion of EU funding; (ii) impact of research on national, EU and global levels; (iii) relevance to transport and (iv) research track record of entrants. A shortlist of four entrants was produced for each transport mode (Road, Rail, Air, Waterborne and Cross modality). The winners were chosen by an expert panel at a selection workshop held at the European Commission in Brussels on February 20th, 2024. The panel consisted of transportation experts and stakeholders, as well as representatives from the EC and academia.

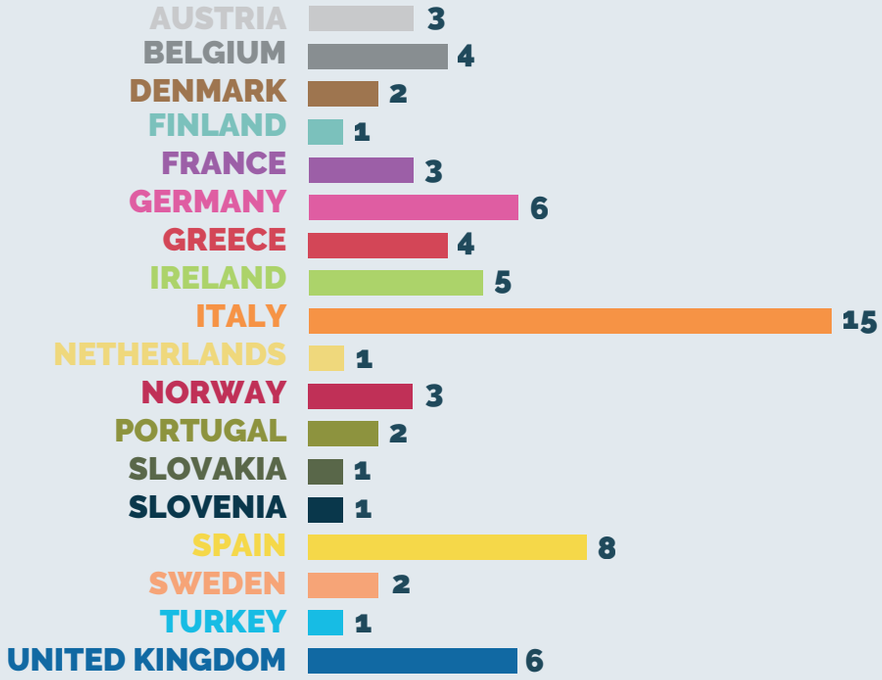
STATISTICS AND OVERALL RESULTS

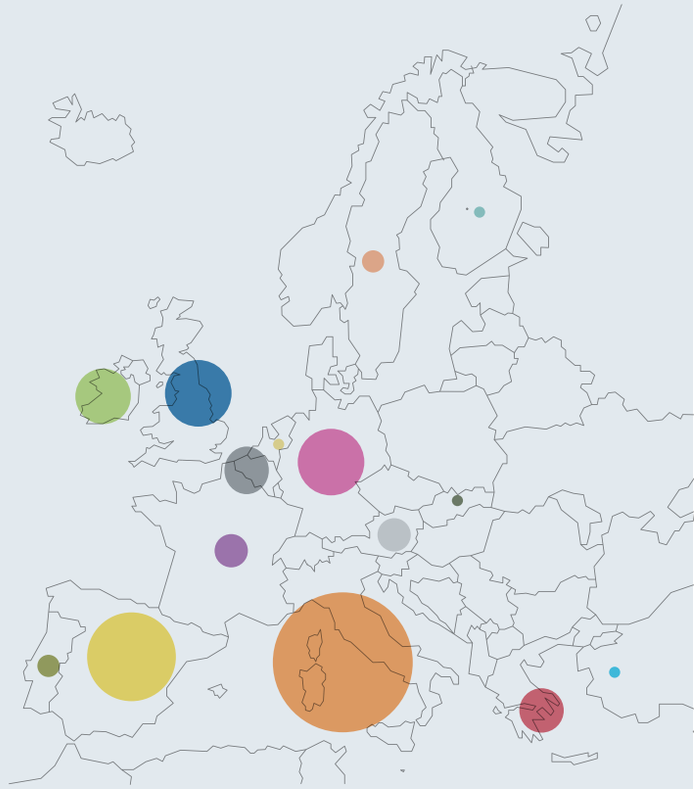
The TRAVISIONS 2024 Senior Researcher Competition received 57 entries of which 45 were longlisted. The following charts contain some statistical information regarding all the seniors' entries.

ENTRIES **PER COUNTRY**

The table above shows the number of entries submitted from each country. Italy was the largest contributor with a total of 15 eligible submissions, Spain came second with 8 entries, and third place is a tie between Germany and the United Kingdom, with 6 entries each.

The chart below shows the number of entries submitted per country.



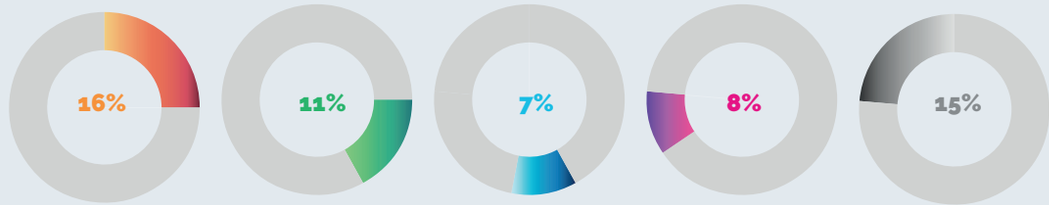


The map on the right shows the entries submitted per country and their geographical spread.

ENTRIES **PER MODE**

A total of 16 road-related entries, 11 rail-related entries, 7 waterborne-related entries, 8 airborne-related entries and 15 cross modal-related entries were submitted for the Senior Researcher Competition.

The chart below shows the number of entries submitted per country.



ROAD
TOTAL PROJECTS
16

RAIL
TOTAL PROJECTS
11

WATERBORNE
TOTAL PROJECTS
7

AIRBORNE
TOTAL PROJECTS
8

CROSSMODALITY
TOTAL PROJECTS
15

TRANSPORT MODE

ROAD

WINNER

WINNER

Giampiero Mastinu

Politecnico di Milano

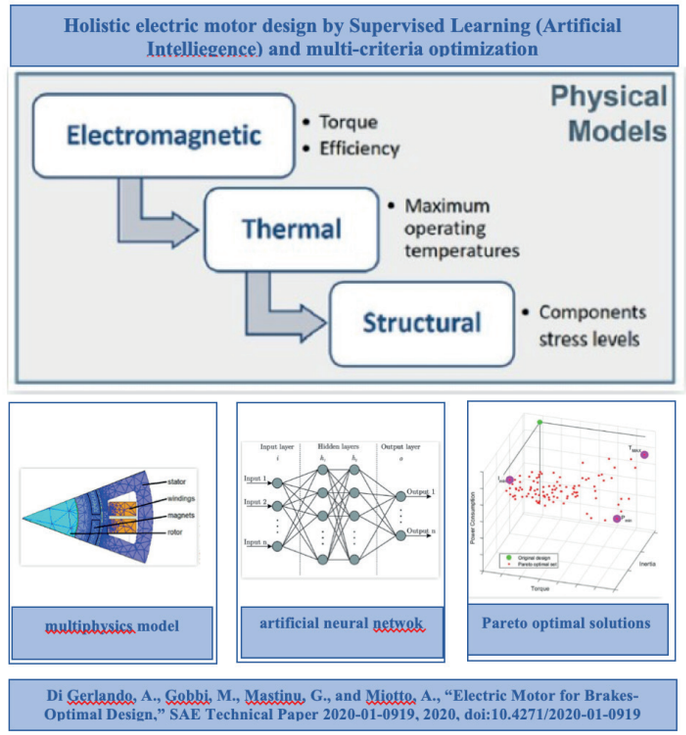
Category: **Road**

Country: **Italy**

Prof. Mastinu, with over 30 years of experience, has contributed significantly to automotive engineering projects, particularly in vehicle electrification. He spearheaded the EU MSCA – ADEPT project (2013), aimed at advancing interdisciplinary design processes for vehicle electrification systems. This initiative, supported by early-stage researchers, focused on electric powertrain design, addressing various engineering aspects such as safety, thermal management, and lightweight construction. Subsequently, the INPROVES project (2018-2020), co-funded by Lombardy Region and ERDF, led to the development of electric motors for brakes and high-performance cars, integrating Artificial Intelligence into the design process. The collaboration involved industry giants like Marelli and Brembo, resulting in successful outcomes and attracting further partnerships with other companies seeking Prof. Mastinu's expertise.

Notably, a pioneering university course on holistic electric motor design, unique in Italy and possibly the EU, was established at Politecnico di Milano, led by Prof. Mastinu and his colleagues. Additionally, Prof. Mastinu played a pivotal role in establishing the National Centre of Sustainable Mobility in Milan, securing funding from the NextGeneration Europe recovery plan. As Secretary General of the Lombardy Mobility Cluster, he initiated the COEVE project, approved in September 2023, aiming to promote industrial reconversion towards electrified mobility in Lombardy. This effort is crucial for maintaining the region's strong automotive industry, ranked 4th in the EU.

Currently, Prof. Mastinu is involved in a NextGeneration Europe-funded project focusing on electric quadricycles with advanced and affordable ADAS systems, further advancing sustainable mobility initiatives.



Professor Gianpiero Mastinu is Full Professor of Ground Vehicle Engineering at the Politecnico di Milano. HE is specialised in Ground Vehicle Engineering, vehicle systems' design and testing, as well as Artificial Intelligence and Human-Machine interface and road vehicle safety. He has published 312 research papers on vehicle design, vehicle electrification and electric motor design, artificial intelligence applied in vehicle design, among others.

Key research themes

Key research themes: Ground Vehicle Engineering, Vehicle Systems Design and Testing, Artificial Intelligence, Human-Machine Interface

SHORT LIST

Key research themes:
Sustainable mobility, autonomous vehicles and mobility, urban mobility

Henriette Cornet

UITP

Category: **Road**

Country: **Belgium**

Dr. Henriette Cornet, a prominent senior research leader, has spearheaded groundbreaking advancements in autonomous vehicle (AV) technology for urban mobility. Her leadership in the SHOW project, funded by the European Commission, facilitated the deployment of AV fleets across 16 European cities, showcasing the EU's commitment to innovation in shared automated mobility. Dr. Cornet's influence extends globally through collaborations in Japan, the United States, and Australia, setting precedents for international cooperation. Apart from SHOW, her involvement in initiatives like ULTIMO and FAME underscores her dedication to advancing automation technologies. Additionally, Dr. Cornet has initiated training programs for public transportation professionals and hosts a popular podcast series, "Automated Mobility – the People behind the Wheel," serving as a knowledge repository for the industry. Her contributions transcend academia, impacting policy development, economic growth, and shaping the future of connected, cooperative, and automated mobility.

SHORT LIST

Key research themes:
Composite materials, hybrid composites, finite element modelling

Yentl Swolfs

KU Leuven

Category: **Road**

Country: **Belgium**

Yentl Swolfs completed his PhD within the FP7 project HIVOCOMP (2010–2014, 7.4 M€), developing fast-curing resins and hybrid self-reinforced composites for automotive applications, patented as WO2013/190149. Post-PhD, prof. Swolfs obtained a Marie Skłodowska-Curie Actions (MSCA) fellowship at Imperial College London, leading initiatives like FiBreMoD (2016–2020, 3.3 M€) and HyFiSyn (2018–2022, 3.3M€) focused on composite research.
Prof. Swolfs supervised PhD researchers collaborating with Toyota Motor Europe and Siemens Industry Software on composite development and process modelling. Swolfs coordinated HyFiSyn, supervising projects with BMW and Sioen Industries, aiming to improve carbon/steel fibre hybrid composites and continue the development of hybrid self-reinforced composites. His research, leading to 85 publications and international events, addresses climate change challenges in the transport sector. Swolfs plans to strengthen ties with the automotive industry, focusing on toughness, reliable modelling, and high-volume production challenges.

Key research themes:
Freight transport, ITS, mobility management

SHORT LIST

Ronald Jorna

Moveco Advies

Category: **Road**

Country: **Netherlands**

Ronald Jorna led and coordinated the Bicycles and ITS (BITS) project, inspired by the observation that Intelligent Transport Systems (ITS) were prevalent in car traffic but largely absent in cycling. As project manager, Jorna oversaw the implementation of 33 ITS solutions across Europe, with meticulous evaluation of 26 deployments. These efforts garnered significant recognition, including the Flemish Road Safety Award.
Notably, the CycleDataHub and BITS directory emerged as pivotal components, paving the way for continued development in the MegaBITS initiative. Beyond implementation, the project facilitated knowledge dissemination through conferences and policy contributions, influencing European cycling declarations and national strategies. With the launch of MegaBITS, Jorna aims to escalate ITS integration in cycling policies, transitioning from pilot projects to large-scale demonstrations across seven cities/regions. MegaBITS seeks to elevate awareness of cycling ITS at national and EU levels, fostering innovative initiatives like smart cycling corridors and citizen engagement programs.

TRANSPORT MODE

RAIL

RAIL

WINNER

WINNER

Francesco Flammini

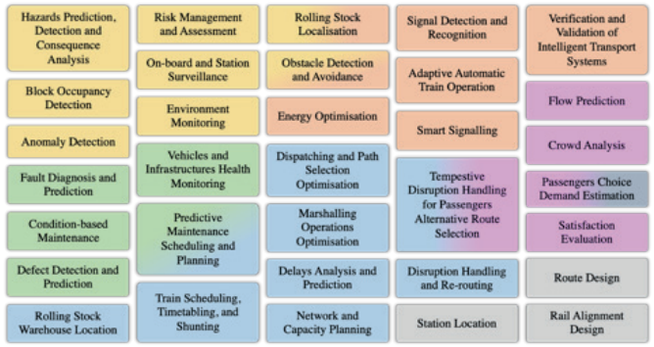
IDSIA USI-SUPSI

Category: **Rail**

Country: **Sweden**

Prof. Francesco Flammini led the groundbreaking RAILS project, which sought to revolutionise the railway industry through the strategic integration of artificial intelligence (A.I.). Conducted within the Horizon 2020 Framework Programme, RAILS harnessed A.I. technologies like machine learning and deep learning to address critical challenges within the sector.
Running from December 2019 to June 2023, RAILS brought together a consortium of research partners from Italy, the UK, the Netherlands, and Sweden. Supported by funding from the European Union's Horizon 2020 programme, the project aimed to promote the development and application of advanced A.I. solutions in rail transport, aligning with the EU's vision for sustainable and efficient transportation.

RAILS focused on three primary areas:
1. Intelligent Train Control: Utilising A.I., the project explored methods such as cooperative train driving and artificial vision to enhance operational efficiency and safety. Real-time monitoring and anomaly detection allowed for immediate alerts to operators, facilitating prompt responses.
2. Intelligent Maintenance: RAILS leveraged advanced data analytics, including machine learning, to predict equipment failures. Proactive maintenance interventions were enabled, optimising asset performance and minimising downtime.
3. Optimised Operations: A.I.-powered optimization algorithms transformed rail operations and traffic management. Intelligent scheduling and routing strategies improved punctuality, reduced congestion, and optimised resource allocation.
Beyond the consortium, RAILS aimed to provide valuable insights and guidance for rail operators, policymakers, and stakeholders across Europe. By disseminating its findings and best practices, the project sought to catalyse widespread adoption of A.I. and machine learning, driving towards a smarter, safer, and more sustainable transportation network.



Francesco Flammini earned his master's (2003) and doctoral (2006) degrees in Computer Engineering from the University of Naples Federico II, Italy. Currently a Professor of Computer Science specializing in Cyber-Physical Systems at Mälardalen University, he has extensive experience spanning nearly 15 years in private and public sectors. Flammini has authored over 100 scientific publications and holds leadership roles in IEEE and ERCIM.

Key research themes

Computer Science, Safety & Security Engineering, Cyber-Physical Systems

SHORT LIST

Key research themes:
Logistic management, Freight Transportation

Patrick Seeßle

DB Cargo AG

Category: **Rail**

Country: **Germany**

Rail freight transport is pivotal in achieving European climate goals, but faces challenges due to limited infrastructure growth. Digitalization and automation are crucial for enhancing efficiency and capacity. Innovative concepts like Automatic Train Operations and Digital Automatic Couplers support this vision, with funding from ERJU.
Dr. Patrick Seeßle leads projects like "Transforming Europe's Rail Freight," aiming to develop Full Digital Freight Train Operations (FDFTO). This encompasses operational and coordination solutions, shared with the rail community through publications and outreach efforts. Ongoing efforts in FP5-TRANS4M-R focus on FDFTO development, including specification, prototype development, testing, and demonstration, all accompanied by research and publications. The outcome of these developments will inform proposals for TSI Updates and European and national regulations, ensuring alignment and sharing of knowledge within the rail freight community.

Key research themes:
Life-Cycle Management, Embedded Safety Critical Systems, Signalling

SHORT LIST

Salvatore Danilo Iovino

Hitachi Rail

Category: **Rail**

Country: **Italy**

Prof. Salvatore Danilo Iovino underscores the importance of European collaboration projects, emphasising diverse expertise and positive engagement as essential factors for success.
He contributed to the OTI project, focusing on onboard train integrity and train length determination functionalities to enhance railway efficiency and capacity. His role involved coordination, requirements specification, safety and performance analysis, demonstrator implementation, and dissemination activities. The objective is to virtually couple trains, reducing distance between them for faster composition and higher line capacity. The Virtually Coupled Train Set (VCTS) project further developed this concept, identifying use cases, performing safety and performance analysis, and developing specifications, impact analysis, migration plans, and business models for European Train Control System (ETCS) application.
Prof. Iovino led the VCTS project within X2Rail-3, contributing to requirements specification, impact analysis, migration plans, and dissemination activities.

TRANSPORT MODE

WATERBORNE

WATER

WINNER

WINNER

Apostolos Papanikolaou

National Technical University of Athens

Category: **Waterborne**

Country: **Greece**

Prof. Apostolos Papanikolaou has been deeply involved in shaping the maritime industry's response to the evolving patterns of seaborne trade and goods transportation. Over the past decade, spanning from 2013 to the present, he has assumed leadership roles in a series of groundbreaking FP7 and Horizon 2020 European Research projects. These projects have been instrumental in addressing the urgent need for substantial reduction of GHG (Green House Gas) emissions from marine operations, aligning with the ambitious targets set by the International Maritime Organisation (IMO) and the European Commission.

One of Prof. Papanikolaou's key contributions lies in his involvement in the development of innovative zero emissions and green vessels. Projects such as TrAM (Transport: Advanced and Modular) and ORCELLE (Wind as main propulsion by ORCELLE) have been pivotal in pioneering new technologies and design concepts aimed at reducing environmental impact and improving sustainability in maritime transportation.

Furthermore, Prof. Papanikolaou has played a central role in projects focusing on maritime and environmental safety, such as SHOPERA (Energy Efficient Safe Ship Operation). These initiatives have contributed to enhancing safety protocols and operational efficiency in marine operations, ensuring compliance with stringent safety standards and regulations.

Additionally, his involvement in projects like HOLISHIP (Holistic Optimisation of Ship Design and Operation for Life Cycle) underscores his commitment to advancing methods and software tools for future ship designs. By leveraging cutting-edge technologies and holistic optimization strategies, these projects aim to revolutionise ship design and operation, paving the way for more efficient, eco-friendly, and sustainable maritime transportation solutions.

Through his contributions, Prof. Papanikolaou continues to drive innovation and progress in the maritime industry, addressing critical challenges and shaping the future of sustainable shipping on both regional and global scales.

Project/ Impact	Science	Economy	Safety	Policy	Environment	Innovation
TrAM	Achieved through systematic numerical optimisation: uniquely high total propulsive efficiency of abt. 80% (>+10%)	Modular design allows reduced building cost Reduced operational (fuel) and life cycle cost		Contribution to the non-zero emissions regulations for high-speed craft at national (Norway) and international (EU, global IMO) level	Zero GHG emissions, zero noise & vibrations	Demonstrator: 1st worldwide battery driven, zero emissions, high-speed passenger vessel
Orcelle	Simulation of combined hydro- and aerodynamics of wind assisted ships	Simulation of combined hydro- and aerodynamics of wind assisted ships Significantly reduced operational (fuel) and life cycle cost	Contribution to the development of standards for wind assisted ships (Class, IMO)	Contribution to the GHG emissions regulations for deep sea cargo wind assisted ships (IMO)	Reduced GHG emissions up to 50% in year-round service	-Planned full scale demonstrator (2027): 1st worldwide large Ro-Ro/PCC carrier (200m length, 7.000 cars capacity) to use wing propulsion as main propulsion unit -2nd demonstrator: refitted PCC carrier (2024) -Patented solid wing wind propulsion system (Oceanbird)
SHOPERA	Simulation of the maneuverability of ships in waves and verification of developed methods/tools		Definition of criteria for the minimum power and maneuverability of ships in waves	Contributions to the formulation and update of the IMO EEDI- Regulations (MEPC70/INF.30)	Resolving the issue of combined safety of ship and emissions of marine environment	
HOLISHIP	Implementation of holistic, multi-objective and multi-disciplinary approach to ship design	Reduced design development cost; optimisation for building, operational and life-cycle cost		Developed design platform enables the development of green ships	Developed design platform enables the development of green ships	Holistic, multi-objective and multi-disciplinary optimisation approach to ship design and implementation of s/w platform (s)

Prof. Apostolos Papanikolaou earned his master's (1972) and doctoral (1977) degrees in Naval Architecture & Marine Engineering from the Technical University Berlin, Germany. He is currently Emeritus Professor at the National Technical University of Athens, he has extensive academic experience spanning more than 40 years. Prof. Papanikolaou has authored over 100 scientific publications, without counting numerous conference papers, technical reports and more.

Key research themes

Naval Architecture, Ocean/Offshore Engineering, Theoretical and Applied/Numerical Ship Hydrodynamics

SHORT LIST

Key research themes:
Marine renewable energy, Self-sustainable autonomous marine vehicles, Experimental and numerical marine hydrodynamics

Weichao Shi
Newcastle University

Category: **Waterborne** Country: **United Kingdom**

Dr. Weichao Shi, a Reader at Newcastle University, specialises in marine renewable energy and propulsion systems. Leading a research team, he focuses on biomimetic marine hydrodynamics, aiming to provide nature-inspired solutions for the maritime industry. With a background in Naval Architecture & Ocean Engineering, his journey began at Harbin Institute of Technology in 2007. He later pursued a PhD at Newcastle University, exploring tidal turbine performance enhancement through biomimetic concepts.
Dr. Shi has led 30+ research projects funded by Horizon Europe, EU-H2020, and others. Notably, he coordinated the RESHIP project, developing energy-efficient hydrogen solutions for ships. His patented Tubercle Assisted Propulsors (TAPs), inspired by Humpback whales, show promise in improving hydrodynamic performance. Dr. Shi's contributions extend to editorial roles and committee memberships in esteemed organisations like ITTC and RINA, reflecting his dedication to advancing marine technology.

SHORT LIST

Key research themes:
Modelling and Control, Mechatronic design, Systems Engineering

Jonathan Baake
Flanders Make

Category: **Waterborne** Country: **Belgium**

Prof. Jonathan Baake is committed to navigating the intersection of technological advancement and environmental responsibility. With expertise in control, mechatronics, and systems engineering, he focuses on developing novel battery architectures to drive the adoption of carbon-free solutions in waterborne transport.
Through the SEABAT project at Flanders Make, Prof. Baake collaborates with a diverse network of European research and industry partners to engineer hybrid energy storage systems. These efforts not only pave the way for cleaner maritime technologies but also encourage policymakers to support the adoption of hybrid cell topologies. The SEABAT project serves as a real-life proof of concept, demonstrating the viability of hybrid battery technology and catalysing commercial investment in sustainable maritime solutions. Prof. Baake's dedication to bridging technological innovation with environmental sustainability underscores his pivotal role in shaping the future of waterborne transport.

Key research themes:
Sustainable Transport & Supply Chain, Transport Policy and Management, Transport Economics

SHORT LIST

Michele Acciaro
Copenhagen Business School

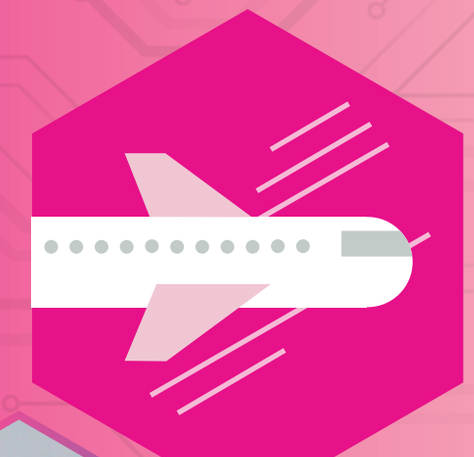
Category: **Waterborne** Country: **Denmark**

Dr. Michele Acciaro earned his master's degree (2004) and his PhD (2010) at the Erasmus University in the Netherlands. In the past 20 years, he taught a variety of courses at bachelor and master level both at Copenhagen Business School, as well as other institutions (Bocconi University; University of Reading/ALBA Business School; Erasmus University Rotterdam; University of Antwerp; World Maritime University; National University of Singapore; Singapore Management University). Also, he taught Managerial Economics; Advanced Topics in Logistics; seminare in Management; Project Management; Maritime Logistics; Port Management; Transport Economics and Policy; Transport and Regional Economics; Sustainability; Research Methods; Sustainability and Port Innovation. In addition, Dr. Acciaro has considerable experience with Executive Education Programs.

TRANSPORT MODE

AIRBORNE

AIR



WINNER

WINNER

Helmut Kühnelt

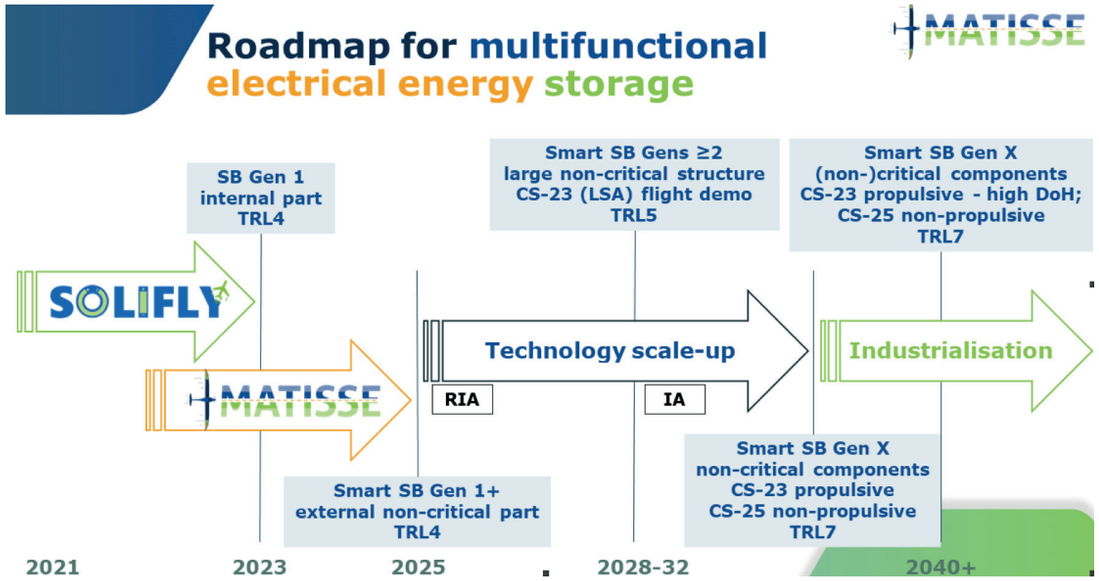
AIT - Austrian Institute of Technology

Category: **Airborne** Country: Austria

Prof. Helmut Kühnelt leads the AIT HEAT (Hybrid-Electric Aircraft Technologies) initiative, overseeing a diverse portfolio of seven EU-funded projects aimed at advancing electric energy storage technologies for climate-neutral air transport. With extensive involvement ranging from project coordination to leading research teams, Prof. Kühnelt plays a pivotal role in driving innovation in structural batteries and next-generation battery systems for aeronautic applications. Leveraging his expertise in control, mechatronics design, and systems engineering, he contributes significantly to the development and analysis of novel battery system architectures that pave the way for faster adoption of carbon-free solutions in waterborne transport applications.

His research contributions are underscored by a robust publication record and collaborations with industry partners, facilitating the dissemination of knowledge and technological advancements in sustainable aviation. Projects like SOLIFLY and MATISSE have garnered attention from prestigious publications such as Popular Mechanics and JEC Composites Magazine, highlighting Prof. Kühnelt's leadership and the impact of his work on the aviation community.

Beyond research, Prof. Kühnelt actively engages in outreach activities to promote awareness and engagement with structural battery technologies, furthering the discourse on climate-neutral aviation. Through his dedication and expertise, he continues to shape the future of electric energy storage in aviation, driving progress towards cleaner, more sustainable air transport solutions that align with the global imperative for environmental stewardship and carbon reduction.



Helmut Kühnelt is scientific project coordinator at Hybrid-electric aircraft technologies team in at AIT Center for Low-Emission transport (AIT-LET), responsible for the research topic Systems for Hybrid Electric Aircraft with focus on aeronautic batteries, definition of the AIT-LET strategic and independent research programmes; coordinator of two EU funded projects on structural batteries: SOLIFLY (Semi-SOlid-state LI-ion batteries FunctionalLY integrated in composite structures for next generation hybrid electric airliner , CleanSky2, 2021-23) and MATISSE (Multifunctional structures with quasi-solid-state Li-ion battery cells and sensors for the next generation climate neutral aircraft, HORIZON EUROPE, 2022-25)

Key research themes

Computational Fluid Mechanics, Aeroacoustics, Hybrid-electric aircraft technologies

SHORT LIST

Key research themes:
Computational Fluid Mechanics, Aeroacoustics, Hybrid-electric aircraft technologies

Pietro Aricò

"La Sapienza" Università di Roma

Category: **Airborne**

Country: **Italy**

Future Advanced Air Mobility (AAM) is a system that aims to transform the current air transportation system into a more agile, flexible, and accessible system. Yet, the considered transformation is not easy to achieve, since it involves providing safety, as well as efficiency to different stakeholders. For analysing the feasibility of such a concept, especially from the passengers' perspective, this research explores what should be the pricing strategies depending on various aspects, such as routing options, vehicle energy management, departure time sensitivity of the passengers, and environmental impact. As routing options, the study considers direct and noise-based routing which is derived through risk assessment considering population density, buildings, and area usage. Performance and energy management for the AAM vehicles will be provided based on detailed flight performance modelling and parametric battery modelling. Also, the relevant cost analysis will be conducted based on the vehicles' battery and location availability and feasibility. Furthermore, an extensive pricing strategy will be studied by combining the outputs of all those models and including the departure time sensitivity of passengers. In addition to the pricing study, the environmental impact of the AAM system compared to ground transportation will be analysed, and relevant cross-modality options will be evaluated. Finally, an interface will be explored consisting of the prices of the selected vehicle and route combinations, alternative options, and the environmental impact comparisons with other modes of transportation. The mentioned interface is expected to be utilised directly by future AAM passengers.

SHORT LIST

Key research themes:
Mechanical Engineering, Computational Fluid Dynamics, Aerospace Engineering

Soledad Le Clainche-Martinez

Universidad Politécnica de Madrid

Category: **Airborne**

Country: **Spain**

Dr. Soledad Le Clainche, a Professor at UPM's School of Aerospace Engineering, has made remarkable contributions to research with over 90 publications and active participation in 40+ conferences. Leading the ModelFLOWs research group, she focuses on developing mathematical models to tackle climate change challenges. Serving as Principal Investigator for six national and European projects, her work aims to enhance aeroplane energy efficiency, reduce urban pollution, and develop personalised medicine for cardiovascular disease prevention.
Dr. Le Clainche's research has led to the creation of ModelFLOWs-app, an open-source software offering AI-based models to the public. Collaborating with international entities, her projects aim to implement cutting-edge solutions to mitigate climate change impacts, gaining attention from media outlets like El Confidencial. Recognized for her contributions, she received the Young Scientist Award from SARES and was listed among the world's top 2% of scientists, showcasing her significant impact on the scientific community.

Key research themes:
Neuroscience, Aerospace, Human-Machine Interaction

SHORT LIST

Gianluca Borghini

"La Sapienza" Università di Roma

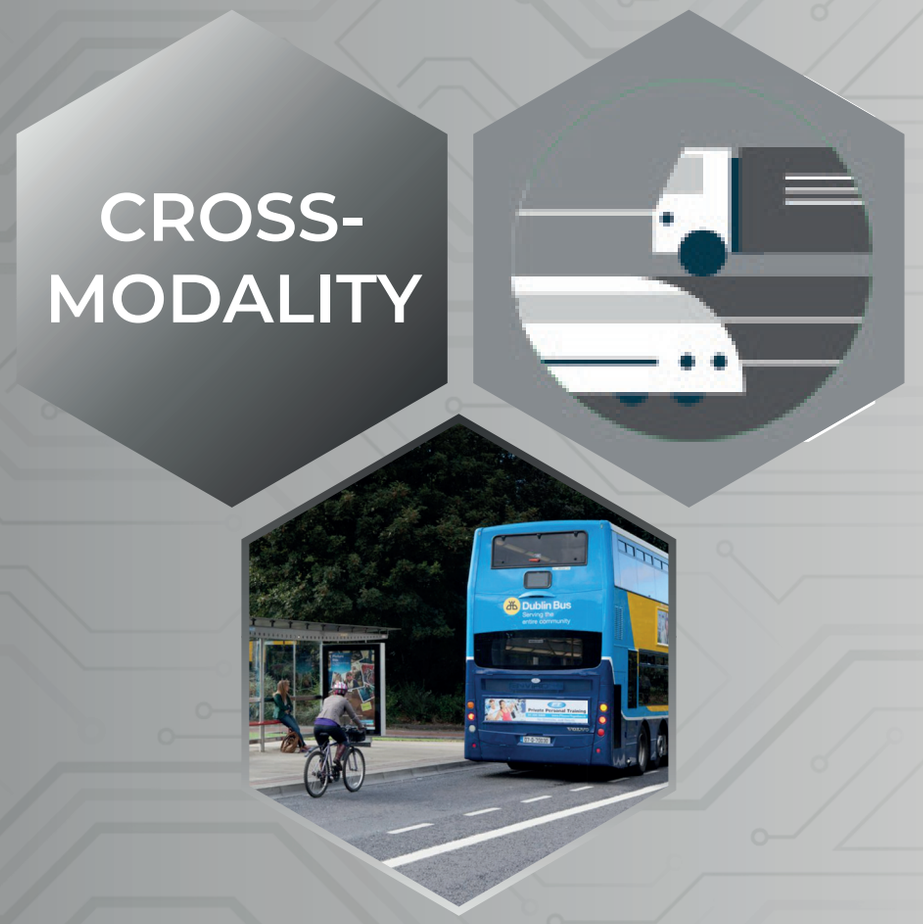
Category: **Airborne**

Country: **Italy**

Dr. Gianluca Borghini has spent nearly 14 years researching neurophysiological measures in Aviation, supported by EU programs like WP7, H2020, and SESAR SJU. His work spans leadership and hands-on roles, impacting national, EU, and global levels. Borghini pioneered using these measures for real-time Adaptive Automation in air traffic control, influencing policy and project calls. He's also engaged in commercial spaceflight research and NATO projects improving performance in defence contexts. Borghini aims to standardise neurophysiological measures in aviation operations, enhancing training and system design. Furthermore, integrating these measures into simulators and cockpits can transform human-machine interactions for safer, more innovative mobility. His research has gained international recognition, placing him among the top scientists in neuroscience and biomedical engineering.

TRANSPORT MODE

CROSSMODALITY



WINNER

WINNER

Paola Cossu

FIT consulting

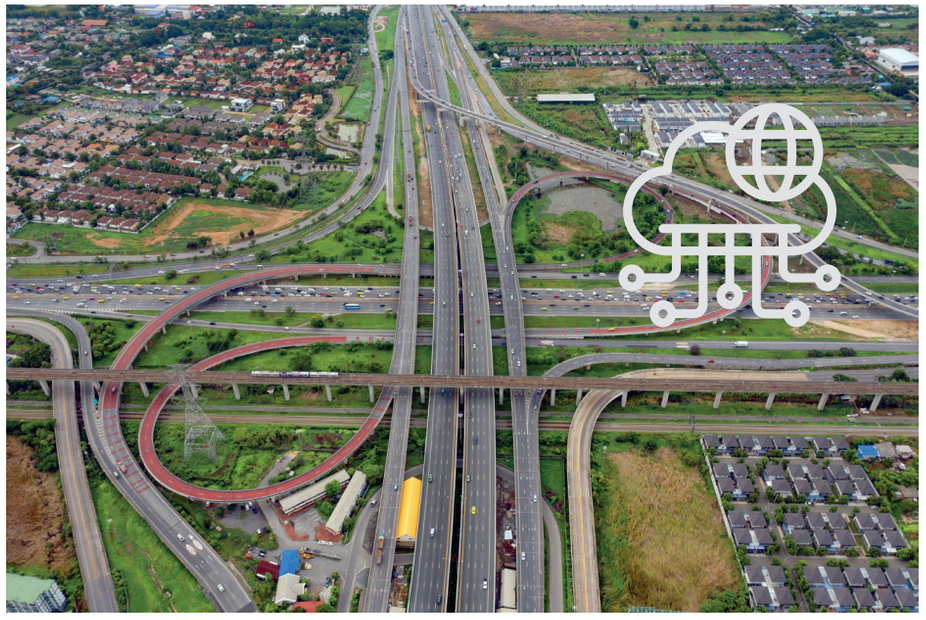
Category: **Crossmodality**

Country: **Italy**

Paola Cossu is committed to revolutionising urban logistics and planning. With 25 years of experience in EU and national R&I mobility, she champions a data-driven ecosystem and Physical Internet to achieve decarbonisation by 2050, aligning with EU Green Deal targets. Challenges posed by e-commerce and emerging mobility patterns drive her collaboration with the Mission Cities Platform and her involvement in co-authoring EU projects such as Mission Cities 2022 - UPPER.

By integrating urban freight transport with public transit, Cossu aims to optimise last-mile delivery, which constitutes over 50% of the total logistics cost. She advocates for implementing advanced models like proximity logistics and smart zones to transform urban areas into interconnected nodes. The concept of a Physical Internet, analogous to email routing, is central to her vision, enabling streamlined goods transport through shared networks and hubs.

Cossu spearheads the DISCO project, which showcases the dynamic allocation of city infrastructures. Additionally, as the chair of the Thematic Group of Urban Logistics in ALICE since 2014, she advocates for cities to shape their transition and manage infrastructures based on real-time data. Her work emphasises the importance of harmonising freight considerations with land-use policy and planning, fostering a collaborative, data-driven approach to urban logistics. Through her leadership and expertise, Cossu aims to drive forward-thinking solutions that address the pressing challenges of urban mobility while promoting sustainability and efficiency in logistics operations.



Paola Cossu is currently and has been Executive Board Chief at FIT consulting for 26 years, after being involved in academic positions such as contract professor in "La Sapienza" University of Rome, Link University and the LUISS Business School, all three are in Rome, Italy. Her expertise focuses on data-driven mobility, multimodal automated logistics, sustainable urban planning, and transport and mobility regulation and governance, among many others.

Key research themes

Sustainable transport, Multimodal Automated Logistics, Data-driven Mobility

SHORT LIST

Key research themes:
Mechanical Engineering, Smart Mobility, Sustainability

Margarida Coelho

University of Aveiro

Category: **Crossmodality**

Country: **Portugal**

Prof. Margarida Coelho, an Associate Professor at the University of Aveiro, Portugal, has pioneered teaching and research in mobility, energy, and the environment. Leading the Smart Mobility research team, she explores the trade-offs between transportation impacts like emissions, safety, and noise. With over 100 scientific papers and involvement in EU-funded projects exceeding €4.5M, she's made significant scientific and policy impacts while engaging the public through numerous events. Currently, she spearheads research on decarbonizing port mobility in the Horizon Europe project "A-AAGORA."
Recognised for her expertise, she serves as Associate Editor for esteemed journals. Looking ahead, Prof. Coelho aims to integrate research and teaching on smart mobility and advocates for attracting girls and young women to STEAM careers, particularly in mobility. Her holistic approach underscores her commitment to advancing clean and inclusive mobility solutions.

Key research themes:
Operations Management, Transportation Engineering and Planning

SHORT LIST

Margarita Kostovasili

ICCS

Category: **Crossmodality**

Country: **Greece**

Margarita Kostovasili, a Transport Engineer/Project Manager, brings over 8 years of experience in infrastructure project management. With an M.Eng from the National Technical University of Athens, she excels in transport planning and modelling, focusing on road and waterborne transportation, logistics, and multimodality. Her expertise spans from studying road driver behaviour to integrating C-ITS applications in road infrastructure and enhancing maritime emergency response.
Currently, she focuses on optimising logistics operations and integrating passenger and freight transportation into a federated ecosystem for seamless interaction. This research, funded by the EU under the DELPHI project, aims to reduce costs, delivery time, and emissions while enhancing resource utilisation. Margarita's role as a Scientific Project Manager/Researcher at ICCS involves coordinating EU-funded projects and providing operational support to NTUA. Her contributions advance intelligent transport systems, smart mobility, and ICT, reflecting her commitment to innovative transport solutions.

SPECIAL

HONORARY AWARD

A new Special Award was introduced for the first time at the 2022 edition, for honouring a senior personality of the transport sector, representing well established researchers, who through the years have made an outstanding and well-recognised contribution to research and innovation in their respective field. Someone who has, throughout their career, demonstrated ground-breaking and future-oriented views and research.

A Selection Board of distinguished and renowned personalities representing all transport modes and the European Commission was created for selecting the winner of the TRA VISIONS 2022 Special Honorary Award (one winner, irrespective of transport mode). An Open Call for nominations was launched to the entire transport research community through the TRA VISIONS 2022 website. Nominations could be made by single persons, including the members of the Board, or groups of persons. Self-nominations were excluded. Each nomination had to include a proper justification (up to two pages long) based on the overall impact, visionary thinking, breakthrough achievements and track record of the nominated person (including but not limited to EU funding policy impact, publication track record, patents and research leadership, etc.). The criteria for the selection of the winner were holistic.

The members of the Selection Board were provided in due time with all nominations for the Special Honorary Award, in order to carefully review and evaluate them. Subsequently, a consensus meeting of the Selection Board took place virtually in March 2024, to select the winner.

HONORARY WINNER

HONORARY WINNER

Dracos Vassalos

Maritime Safety, University of Strathclyde

Category: **Waterborne**

Country: **United Kingdom**

Prof. Dracos Vassalos has dedicated over four decades to advancing maritime safety, leaving an indelible mark on both academia and industry. With 25 years as a full Professor, his influence in the field is profound. Notably, he pioneered the concept of "Design for Safety" in the maritime sector, championing a shift towards goal-based legislation that has transformed safety standards globally. Recognised for his lifelong contributions, Prof. Vassalos has received four awards and earned a place in the Ship and Offshore Structures Journal's Hall of Fame as a Pioneer in Maritime Safety. His research prowess is evident in his extensive publication record, which includes over 700 technical publications and books. Moreover, his leadership in supervising more than 75 PhD students underscores his commitment to shaping the next generation of maritime safety experts.

A visionary in risk-based design methodology, Prof. Vassalos has spearheaded transformative changes in maritime safety research. His establishment of the first Centre of Excellence on Maritime Safety Research within a university environment further demonstrates his dedication to advancing the field.

Beyond academia, Prof. Vassalos's impact extends to other sectors, notably influencing safety and environmental practices in the rail industry. His work serves as a beacon for interdisciplinary collaboration, highlighting the interconnectedness of safety across different modes of transportation. Through his leadership, research, and advocacy, Prof. Vassalos has elevated the discourse on maritime safety, leaving a lasting legacy that continues to shape industry standards and practices worldwide.

Prof. Dracos Vassalos, a leading expert in Maritime Safety at the University of Strathclyde, Glasgow, UK, directs the Maritime Safety Research Centre. He introduced the "Design for Safety" concept in 1995 and has led its implementation with over 100 R&D projects. Vassalos founded Safety at Sea Ltd., shaping maritime safety research and industry standards. Recognised with prestigious awards including the Sustainable Achievement Award from the Royal Academy of Engineering (2011) and the Froude Medal (2012) and David Taylor Medal (2016). Awarded a DSc from Strathclyde University in 2015, he's one of only two Naval Architects to receive this honour in the UK.

Key research themes

Maritime Safety

TRAVISIONS 2024 CONSORTIUM PARTNERS

University College Dublin (coordinator)
Beatriz Martinez-Pastor
Belfield
Dublin 4, Ireland
www.ucd.ie

BALance Technology Consulting GmbH
Markus Lehne
Contrescarpe 33
28203 Bremen, Germany
www.bal.eu

Centre for Research and Technology Hellas/ Hellenic Institute of Transport (CERTH/ HIT)
Evangelia Gaitanidou
6th km Charilaou-Thermi Rd, PO Box 60361
57001 Thermi, Thessaloniki, Greece
www.hit.certh.gr

CPI - Conference Partners International
Amy Bartlett
Suite 21 Hyde Building The Park
Dublin 18, D18 V448, Ireland
connect@conferencepartners.com
https://conferencepartners.com

Deep Blue ltd
Micol Biscotto
Via Daniele Manin 53
00185, Rome, Italy
www.dblue.it

European Conference of Transport Research Institutes (ECTRI)
Caroline Almeras
Rue du Trône 98
1050 Brussels, Belgium
www.ectri.eu

EURNEX - EUropean rail Research Network of Excellence
Armando Carrillo Zanuy
Hardenbergstraße 12
10623 Berlin, Germany
info@eurnex.eu
www.eurnex.org

EUROPE'S NATIONAL ROAD RESEARCH CENTRES (FEHRL)
Thierry Goger
info@fehrl.org
Boulevard de la Woluwe 42,
1200 Brussels, Belgium
www.fehrl.org

MAGELLAN
Iryna Moroz
geral@magellan-association.org
Av. da Boavista, 1588 7
4100-115 Porto, Portugal
https://magellan-association.org/en/

Newcastle University
Mark Robinson
Newcastle upon Tyne
Tyne and Wear
NE1 7RU, United Kingdom
www.ncl.ac.uk

POLIS
Ivo Cré
Rue du Trône, 98
B-1050 Brussels, Belgium
polis@polisnetwork.eu
www.polisnetwork.eu

SEA EUROPE - SHIPYARDS' & MARITIME EQUIPMENT ASSOCIATION
Monia El Faziki
Rue de la Loi 67
1000 Brussels, Belgium
info@seaeurope.eu
www.seaeurope.eu

SLOT CONSULTING
Roland Guraly
Bánffyhunyad u. 14/B
1182 Budapest, Hungary
info@slotconsulting.eu
www.slotconsulting.eu

Trinity College Dublin
Bidisha Ghosh
College Green
Dublin 2, Ireland
www.tcd.ie

WEGEMT (coordinator)
George Smyrnakis, Secretary General
8-9 Northumberland Street
London, WC2N 5DA,
United Kingdom
george.smyrnakis@ncl.ac.uk
www.wegemt.com

This project has received funding from the European Union's Horizon Europe Research and Innovation programme, Grant Agreement No 101056931.

TRAVISIONS 2024 ADVISORY BOARD

ANADOLU ÜNİVERSİTESİ
CHALMERS
AVL
Bauhaus Luftfahrt Neue Wege.
Bern University of Applied Sciences
BMT
BOMBARDIER
CIMNE International Centre for Numerical Methods in Engineering
CTU CZECH TECHNICAL UNIVERSITY IN PRAGUE
CENTRALE NANTES
easn
EMBRAER
ENAC
enav
UNIVERSITÀ DEGLI STUDI FIRENZE
GDAŃSK UNIVERSITY OF TECHNOLOGY
GKN AEROSPACE
Road and Bridge Research Institute
IFSTTAR
IMAREST
İTÜ GLOBAL İTÜ
KIT Karlsruher Institut für Technologie
KTH VETENSKAP OCH KONST
LINKÖPING UNIVERSITY
EUROCONTROL
LABORATÓRIO NACIONAL DE ENGENHARIA CIVIL
MARIN
NTNU
National Technical University of Athens
POLITECNICO MILANO 1863
POLITÉCNICA
POLITECNICO DI TORINO
RAMBØLL
SAPIENZA UNIVERSITÀ DI ROMA
SJ
TRAFIKVERKET SWEDISH TRANSPORT ADMINISTRATION
TRANSPORT STYRELSEN
TU WIEN TECHNISCHE UNIVERSITÄT WIEN
UCL
UNIVERSIDADE DA CORUÑA
UNIVERSITY OF BELGRADE
LIÈGE université
UNIVERSITÉ DE LYON
L-Università ta' Malta
UCG
UNIVERSITY OF PIRAEUS
University of Strathclyde Glasgow
VILNIUS GEDIMINAS TECHNICAL UNIVERSITY
VINNOVA
VUB VRIJE UNIVERSITEIT BRUSSEL
vti

SPONSORS & SUPPORTERS 2024

European Commission

TRAVISIONS 2024
YOUNG RESEARCHER COMPETITION SPONSORS AND SUPPORTERS

ERTRAC

ROAD SPONSOR

Europe's Rail

RAIL SUPPORTER

WATERBORNE

WATERBORNE SPONSOR

UITP ADVANCING PUBLIC TRANSPORT
alice Alliance for Logistics Innovation through Collaboration in Europe

CROSSMODALITY SPONSORS

Collins Aerospace
deepblue
FREQUENTIS

AIRBORNE SPONSORS

ACKNOWLEDGEMENTS

We would like to thank the following experts for taking part in the TRAVISIONS 2024 project as remote evaluators and/or panellists.

REMOTE EVALUATORS

YOUNG RESEARCHER COMPETITION **ROAD**

Adewole Adesiyun, *FEHRL*
Xavier Aertsen, *ERTRAC*
Thierry Goger, *FEHRL*

SENIOR RESEARCHER COMPETITION **ROAD**

Adewole Adesiyun, *FEHRL*
Xavier Aertsen, *ERTRAC*
Thierry Goger, *FEHRL*

YOUNG RESEARCHER COMPETITION **RAIL**

Federico Antoniazzi, *École des Ponts ParisTech*
Stefano Bruni, *Politecnico di Milano*
Armando Carrillo Zanuy, *EURNEX*
David Connolly, *University of Leeds*
El Miloudi El Koursi, *Université Gustave Eiffel*
Francesco Flammini, *Mälardalen University*
Ernesto Garcia Vadillo, *Universidad del País Vasco*
Ke Guan, *Beijing Jiaotong University*
Markus Hecht, *TU Berlin*
Nils Jendrny, *RWTH Aachen*
Annie Kortsari, *CERTH/HIT*
Marin Marinov, *Aston University*
Otto Plasek, *Brno University of Technology*
Stefano Ricci, *"La Sapienza" Università di Roma*
Mark Robinson, *Newcastle University*
Juan de Dios Sanz Bobi, *Universidad Politécnica de Madrid*
Sebastian Stichel, *KTH Royal Institute of Technology*

SENIOR RESEARCHER COMPETITION **RAIL**

Armando Carrillo Zanuy, *EURNEX*
David Connolly, *University of Leeds*
El Miloudi El Koursi, *Université Gustave Eiffel*
Annie Kortsari, *CERTH/HIT*
Uday Kumar, *Technical University Luleå*
Juliette Marais, *Université Gustave Eiffel*
Peter Marton, *University of Žilina*
Evangelos Mitsakis, *CERTH*
Tatiana Molkova, *University of Pardubice*
Otto Plasek, *Brno University of Technology*
Stefano Ricci, *"La Sapienza" Università di Roma*
Mark Robinson, *Newcastle University*
Celestino Sanchez, *EURNEX*
Juan de Dios Sanz Bobi, *Universidad Politécnica de Madrid*

YOUNG RESEARCHER COMPETITION **WATERBORNE**

Carlo Cau, *CETENA*
Leonidas Drikos, *Glafcos Marine*
Ioannis Ergas, *WEGEMT*
Hossein Ghaemi, *Politechnika Gdańska*
Alistair Greg, *University College London*
Tony Morrall, *Consultant*
Apostolos Papanikolaou, *National Technical University of Athens*
Peilin Zhou, *University of Strathclyde*

SENIOR RESEARCHER COMPETITION **WATERBORNE**

Leonidas Drikos, *Glafcos Marine*
Ioannis Ergas, *WEGEMT*
Alistair Greg, *University College London*

YOUNG RESEARCHER COMPETITION **AIRBORNE**

Carlo Abate, *Deep Blue*
Marcello Amato, *CIRA*
Daniele Baranzini, *HAIKAI*
Francisco Javier Camacho Font, *COLLINS Aerospace*
Lorenzo Castelli, *Università di Trieste*
Marco Duccii, *EURO-USC Italia*
Thomas Feuerle, *Technische Universität Braunschweig*
Paula Lopez Catalá, *INNAXIS*
Annika Paul, *DGLR*
Damiano Taurino, *Deep Blue*

SENIOR RESEARCHER COMPETITION **AIRBORNE**

Vassilis Kappatos, *CERTH/HIT*
Filippo Tomasello, *EURO-USC Italia*

YOUNG RESEARCHER COMPETITION **CROSS MODALITY**

Verena Ehrler, *IESEG School of Management*
Domokos Esztergár-Kiss, *Budapest University of Technology and Economics*
Françoise Guaspare, *Île-de-France Europe*
Umberto Guida, *UITP*
Giulia Maifrini, *NextMove*
Claude Marin-Lamellet, *Université Gustave Eiffel*
Maria Morfoulaki, *CERTH*
András Munkácsy, *KTI*
Matthias Prandtstetter, *Austrian Institute of Technology - AIT*
Judit Sandor, *Europe's Rail*
Johanna Tzanidaki, *ERTICO – ITS Europe*
Peter Wagner, *DLR*
Christos Xenophontos, *Rhode Island Department of Transportation - RIDOT*

SENIOR RESEARCHER COMPETITION **CROSSMODALITY**

Umberto Guida, *UITP*
Pedro Homem de Gouveia, *POLIS*
Mark Robinson, *Newcastle University*
Anu Tuominen, *VTT*
George Yannis, *National Technical University of Athens*

2024 BOOK **AUTHORS**

Micol Biscotto, *Deep Blue*
Ina Schingler, *BALance*
George Smirnakis, *WEGEMT*
Alessandro Tedeschi *Gallo, Deep Blue*
Graphics and Layout by Deep Blue

PANELISTS

ROAD PANEL

Xavier Aertsens, *UCL*
Evangelia Gaitanidou, *CERTH/HIT*
Bidisha Ghosh, *Trinity College Dublin*
Beatriz Martinez-Pastor, *University College Dublin*
Guido Sacchetto, *European Commission*

RAIL PANEL

Estelle Bacconnier, *European Commission*
Armando Carrillo Zanuy, *EURNEX*
Miguel Casero Flórez, *University College Dublin*

WATERBORNE PANEL

David Abril Molins, *WATERBORNE*
Carlo Cau, *CETENA*
Leonidas Drikos, *Glafcos Marine*
Alistair Greig, *University College London*
Ioannis Ergas, *WEGEMT*
George Smirnakis, *WEGEMT*
Peilin Zhou, *University of Strathclyde*
Carlos Guedes Soares, *University of Lisbon*

AIRBORNE PANEL

Lorenzo Castelli, *Università di Trieste*
Niclas Dzikus, *European Commission*
Sebastian Grimm, *Collins Aerospace*
Roland Guraly, *SLOT Consulting*
Vasilis Kappatos, *CERTH/HIT*
Michael Kyriakopoulos, *European Commission*

CROSSMODALITY PANEL

Caroline Almeras, *ECTRI*
Umberto Guida, *UITP*
Patrick Mercier-Handisyde, *European Commission*
András Munkácsy, *KTI*
Ana Pereira, *ECTRI*
Mark Robinson, *Newcastle University*

Please note that in case of conflict of interest, the panellist was not allowed to vote for that session.