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Future-Proofing Freight: ReMuNet's Pathway Towards A Resilient And Sustainable European Transport

Janis Simons^a, John von Stamm^a, Lars Klapper^a, Gerrit Hoeborn^a, Maik Schuermeyer^b,
Ketki Kulkarni^c, Florian Krietsch^d, Maria Kontogianni^e

^aFIR, Institute for Industrial Management at RWTH Aachen University, Aachen, Germany

^bMansio GmbH, Aachen, Germany

^cHUMLOG Institute, Supply Chain Management and Social Responsibility, Hanken School of Economics, Helsinki, Finland

^dPTV GmbH, Karlsruhe, Germany

^eWhite Research, Brussels, Belgium

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The European transport landscape, which is increasingly burdened by the risk of natural disasters, pandemics and geopolitical conflicts, requires a rethink in designing and managing of its multimodal transport networks. The Resilient Multimodal Transport Network (ReMuNet) research project is a response to this problem and a beacon of hope for innovation and strategic thinking. This extended abstract provides an overview of the ReMuNet project, in which, after an introduction, the methodology and results are presented.

Introduction

The research project "Resilient Multimodal Transport Network" (ReMuNet) addresses critical challenges within the European transport landscape, such as natural disasters, pandemics, and geopolitical conflicts (Kiebler et al, 2020).

Existing transportation management systems (TMS) lack the ability to calculate disruptive events. In synchronomodal traffic, particularly relay traffic, these limitations necessitate innovative solutions. The absence of standardized data exchange, intensified by proprietary protocols and disparate data models from various providers, poses significant security risks and hinders the creation of uniform data pools across supply chains, thereby undermining the development of resilience (Fraunhofer IML, 2019). Moreover, despite the critical role of synchronomodal transportation, the lack of a comprehensive global multimodal travel planner and holistic models remains a persistent challenge (Bast et al., 2016).

Methodology

ReMuNet aims to close existing gaps by identifying and reporting disruptive events. Key objectives include assessing the impact of these events on transport corridors and efficiently communicating alternative multimodal routes to various stakeholders such as logistics companies, truck drivers, train drivers and barge captains. Additionally, the system coordinates route and capacity utilization, enabling the network to respond more quickly and adaptably to disruptions.

The overarching goal of the research project is to improve the resilience of the European transportation system. This includes mitigating disruptions, minimizing emissions and improving the overall efficiency of the transport network. The implementation of proactive measures should protect against future disruptions in the eurozone and mitigate the current economic damage estimated at EUR 112.7 billion (Ollagnier et al., 2023). ReMuNet also focuses on environmental aspects, aligning with the objectives of the EU's Green Deal and the UN's Sustainable Development Goals.

The approach to achieving these goals is divided into seven steps. The first step focuses on developing a standardized traffic ontology and a typology of disruptive events to promote a common understanding among

stakeholders. Following this, these components will be implemented in a reference model that includes routing algorithms and prediction models for improved resilience. The development of a collaborative platform to facilitate information exchange between stakeholders will be emphasized. Additionally, a self-learning algorithm for continuous improvement of route planning and capacity allocation will be introduced in the fourth step. The practical application will be tested in the fifth step through pilot corridors, evaluating social and environmental aspects. The sixth and seventh steps will cover project coordination and knowledge dissemination, respectively.

Results and Conclusion

ReMuNet plays a central role in reshaping European transport by strengthening resilience, reducing emissions and increasing efficiency. Through its multi-layered approach, ReMuNet not only addresses current challenges but also contributes to the broader vision of the Physical Internet and synchromodal transport.

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