

Disruptions in the EU Transport Network: How Stakeholders View Them

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The transport network in Europe is facing severe and frequent disruptions due to the dynamic geo-political situation in the region, and the effects of climate change. The EU Horizon project Resilient Multimodal Transport Networks (ReMuNet) is focused on improving the resilience of the transport network, considering alternate routing options, and identifying disruptions and ways to mitigate their effects. As natural catastrophes multiply in the wake of climate change, the risks of pandemics and geopolitical conflicts are omnipresent, the threat of disruptive events to the European transport network grows ever greater (Caramuta et al., 2023; Craighead et al., 2020). With increasing complexity of global supply chains and closely timed transport schedules, the vulnerability of European trade to disruptive events will continue to increase unless transport networks become more resilient (Kiebler et al., 2021). ReMuNet identifies disruptive events and assesses their impact on multimodal transport networks.

One of the four core objectives of the ReMuNet project is to develop a standardized methodology to describe multimodal transport networks. The proposed standard is derived from existing approaches and developed together with critical stakeholders to ensure Europe-wide practicability and acceptance. This allows for the standard to be easily transferred into appropriate regulatory frameworks ensuring more efficient communication and operational stakeholder interconnectivity. The first task towards this core objective is *Creating a typology of disruptive events*, which is addressed in this work. Building on existing typologies, for example classifications of disasters, this report analyzes disruptive events in European transport networks for a better understanding of the disruptions, the potential reactions to them and the actions to prevent them from occurring and to mitigate their effects.

As a first step in this research, the team at HUMLOG Institute (Hanken School of Economics) conducted a qualitative study including 17 interviews and 2 focus group discussions to 1) define disruptive events from the perspective of logistics operators and key stakeholders, 2) to identify frequently occurring and severe disruptive events and 3) to understand standard practices of managing these disruptive events. The respondents represent different modes (links) and nodes of the transport chain including ports, inland waterway management, freight shipping handlers, network planners, terminal operators across rail, road, air, and waterway transport. It is expected that different stakeholders view disruptions differently, depending on their perception of the transport network. This work presents the details of the analysis done to define disruptions from the viewpoint of the different stakeholders and synthesizing a list of categories for disruptive events. One of the key findings from this study was that although stakeholders have different definitions for disruptions, their thoughts on disruptions converge to thematic groups such as viewing disruptions as blockages, delays, or change in business-as-usual.

This study is an important exercise to achieve the ultimate goal of the project: *the building of a collaborative platform and taking the first steps towards an Artificial Intelligence (AI) based self-learning transport network to promote synchro-modal relay transport across European rail, road, and inland waterways to improve network resilience, reduce emissions, and boost corridor efficiency during disruptive events*. The terminology and

classifications developed in this qualitative study will be a critical input to the mathematical models that follow in subsequent work packages in the project.

The participants of the study stated that disruptions can be defined as one of the following: a blockage of flows, a technological paradigm shift, delays in schedule, unplanned events, or any deviations from business-as-usual. Fig 1 shows these 5 themes.

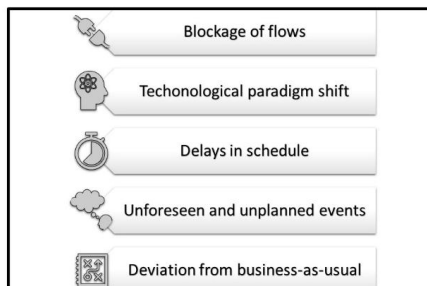


Fig 1. Five themes of disruption definitions.

During the qualitative research conducted for this study, one aspect that was evident is that researchers and stakeholders lack consensus on what constitutes disruptive events. While certain major events such as the COVID-19 pandemic or flash floods are all easily identified and agreed to be disruptive event, the transport network users find it hard to agree on some other events. For example, change of legislation affecting transport operations, workforce shortages (or strikes), and lack of standardized communication were identified by some participants in the focus group discussions. This viewpoint was also supported by nearly 60% of the interviewees. However, there were many others who did not view such planned or foreseen events as disruptions. One main point of contention was the perceived magnitude of impact associated with the term “disruption”. At least 40% of the interviewees and 4 out of the 6 groups participating in the focus group discussions associated the term disruption to an event that results in a complete transformation of the business, place, or person.

Of the 5 themes of disruption definitions, themes 1 (blockage of flows), 3 (delays in schedule), and 5 (deviation from business-as-usual) have a similar basis. All three views believe that there is a baseline scenario of operations which may be called a plan, a schedule, or business-as-usual. Any interruption to the baseline, be it in the form of delays, blockages, or entire closure of the system, is a disruption. Although theme 2 (technological disruption) has a positive connotation, it also brings about a change to the normal operating procedures and patterns (possibly quite radically). Hence, it could be argued that this theme, in spirit, agrees with the more general ideas of themes 1, 3, and 5. Theme 4 stands out from the other themes and presents an idea that is disputed and hotly debated. The participants were strongly divided on whether disruptions need to be unexpected. Leaving aside theme 4, all other definitions and views on disruptions expressed in the data collected for this report can be reflected by the following definition of disruptions: “A disruptive event can be defined as any interruption or change, planned or unplanned, in the operations of a transport network, creating effects, such as delays, blockages or closures”.

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