

HORIZON-CL3-2022-DRS-01-02: *Enhanced Preparedness and Management of High-Impact Low-Probability or Unexpected Events*

Objective of the project

The project aims to propose measures to strengthen the surface transportation infrastructure's resilience if the backbone infrastructure's transport capacity is significantly reduced due to a severe hybrid threat.

Project annotation

Security risks and their management are an integral part of the security and transport policy of the state, which has overlaps into almost all sectors of the economy. Resilient transport infrastructure also plays an indispensable role in the ability to counter security threats, to ensure the sustainability of the development of society and at the same time to fulfil the declared obligations arising from the country's membership in NATO and the EU. The EU and NATO strategic documents and recent developments in the world show that the risk of disruption of distribution networks and the ability to sustain the long-term functionality and availability of logistics infrastructure capacities is increasing. In addition to these threats, other security threats have been identified within NATO and the EU. The manifestations of hybrid threats and the risks arising from them are currently very intensively perceived. One of the types of such threats is specific, intentional threats aimed at limiting and/or disrupting the functionality and capacities of the land transport infrastructure, e.g. the impact of sabotage and terrorist actions, cyberattacks on road and rail transport control centres, blockades, but also the threat of such attacks or blockades themselves, etc. In addition to the damage to property and possibly lives, these hybrid threats also entail broader socio-economic damage, the amount of which is largely directly proportional to the maturity of the economy, the intensity of transport and the degree of digitisation. All of these threats are further exacerbated when cascading effects occur.

The project will identify the most significant threats with the potential to fundamentally disrupt the functioning of the land transport infrastructure through analytical and predictive techniques, based on research into past conflicts and hybrid campaigns within EU/NATO member countries. The analysis will also focus on the situation of a significant hybrid threat with the potential to evolve into a traditional conventional military conflict in the countries whose territory is used for the movement of military equipment of the armed forces of NATO countries. In this case, the hybrid threat would have more significant effects, as the movement of military convoys and other military transports itself would place an additional burden on the infrastructure, or there would be increased use of transportation in selected sectors (transport of raw materials, etc.). If the hybrid threat occurs, there is a high probability of congestion on the detour routes, and the passage of military vehicles will be effectively impossible.

The identified threats will serve as a basis for the formulation of possible scenarios of limitation (in hours) or disruption (in days) of the functionality and availability of the land transport infrastructure. The most vulnerable points of the transport infrastructure will be identified, where the implementation of the threats would represent a major disruption of traffic flow and significant economic damage. Based on the developed transport infrastructure model, simulations of the impacts of typical hybrid threats and cascading effects will be performed to identify the probability, degree and extent of impacts on the functionality and availability of transport infrastructure. The outputs of the simulations will be verified by confronting them with the behaviour of infrastructure users on the basis of mobility data (Regional Transport Authority, signalling data of mobile operators, transport operators, infrastructure managers, Google API). The quantification of impacts on traffic flow will

consider the infrastructure's capacity, its technical parameters, and the possibilities of potential diversion routes. The outputs of the formulated scenarios and simulations will be the input parameters for the calculation of socio-economic damages, which will take into account a wide range of external costs resulting from the reduction of traffic throughput directly at the event site and insufficient parameters detour routes. The values of time and other economic losses (unrealised transport, necessity to implement alternative solutions) resulting from the disruption of the traffic capacity of the routes will be calculated. The output will also include a conceptual design of a solution to ensure the resilience and desired functionality of the surface transport infrastructure and serviceability of the affected area/region, including the ability to respond adequately and promptly to ensure traffic capacity.

In addition to detailed analysis on selected scenarios, which will be formulated for each specific location and threat, a recommended methodological procedure will be formulated for identifying risk locations and quantifying the socio-economic costs in the event of a threat being realised. This analysis and socio-economic calculation provides a basis for managerial decisions regarding infrastructure investments to strengthen the resilience of the transport infrastructure of the EU/NATO countries, where a relatively low investment can prevent enormous societal costs in the event of a realised threat.

The project's main output will be a detailed expert study and specialised map including key points of land transport infrastructure in terms of hybrid threat risk, potential vulnerabilities, results of transport simulation of implemented scenarios, including calculation of socio-economic costs. The accompanying output will then be a recommended methodological procedure for identifying risk points related to transport infrastructure, costing of the implemented threat and identification of indicators of hybrid action in relation to the functionality, availability and sustainability of transport infrastructure.