

## Anomaly Detection in Supply Chains Using the Freight Theft Phenomenon as an Example

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Worldwide value chains are threatened by illegal activities, and globally operating companies are particularly affected. In many cases, however, the threat manifests itself on a small scale, across nations, and across national borders. Organized crime (OC) takes particular advantage of the current lack of cooperation in matters of security and law, and secures its own power through structural violence.

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<b>Damage Potential</b>	<p>TAPA has so far estimated the annual material damage for the EU region at around €8 billion. Depending on the source, the annual material damage in Germany is estimated at between €1.5 billion and €6 billion. However, all figures are only rough estimates, will be even more difficult for the EU with the BREXIT, and for Germany only grow up with the years, since only in 2020 an offense code for the police forces was introduced on a large scale. The number of unreported cases will remain high for many years, and the problem will tend to grow with increasing logistics.</p> <p>The immaterial damage caused by delayed deliveries, production delays, loss of sales, individual violations of applicable traffic laws to reduce damage remain unquantifiable, not to mention the fears of the drivers.</p>
<b>Requirements</b>	<p>Legal activities such as the Supply Chain Act are ethically motivated and do not contribute anything concrete to the prevention of crime. As a spillover, however, information sharing as well as the option of using existing infos aggregation could also be used to track OC - and thus stabilize supply chains.</p> <p>Internal guidelines and required certifications could necessitate closer tracking of shipments.</p> <p>Cross-regional stakeholders of logistics companies could encourage truck manufacturers to become more involved in promoting truck safety through various engagements, campaigns, as well as public opinion formation.</p>
<b>Need for Action</b>	<p>Neither the police nor the judiciary have kept pace with the growth of OC in the EU, so that in 2019 the risks for OC are considered to be very low. In contrast, the liability risks for freight forwarders (recourse) have rather increased, so that many freight forwarders have withdrawn from large-scale logistics, and especially Eastern European drivers form so-called "protective communities" on parking lots at night.</p> <p>There is a need to include all elements of the supply chain, including the freight transport route, in order to make the partial or total exchange of loads more difficult.</p> <p>The further increase of freight transports in terms of volume, weight and value, also up to the final consumer, will require the avoidance of cost increases. It is therefore questionable whether - as in the past - material damage can be covered by insurance and simply passed on to the general public through premium increases.</p> <p>There must therefore be a reassessment of the weighting between supply chain security, security in the public sphere, and data protection. The aim should be to restore the right of the respective freight forwarder to be in-</p>

formed in full and without delay about the data recorded about its property (trucks and trailers), and not only after several days when collecting tolls and fees.

## **Methods**

### **Methodology Traditional**

Within Germany, there was very little awareness of the problem until 2016. The OC tried to avoid personal injury (and thus criminal escalation), the freight forwarders tried to avoid delivery delays by reporting to the police, the police worked only within their respective jurisdiction and tried to define the crimes as thefts and to minimize the involvement of OC, the judiciary processed submitted cases at the level of the districts / district courts. Specifically: everything within the framework of "available resources at the local level" - the criminals regularly escaped. Even drivers found dead in the cab did not lead to rethinking - it was not classified as a "phenomenon".

It was only when a special commission started to compile data from several federal states that the classification as an OC crime could no longer be ignored.

The OC groups, for their part, developed sophisticated variants of action: from theft to the replacement of entire loads with plagiarized goods, from random attacks to random slashing and commissioned theft.

### **FIFI Capability Enhancement**

With FRADI, FIFI aims at an enormous increase in capability, which can make reliable information available both to the transport companies as owners of the respective data of their vehicles and to the police and ultimately to the judiciary - without exposing the drivers, as the weakest link in the supply chain, to any danger. However, the foreseeable increase in the amount of data and information can only be processed by automated correlation.

The movement plans, and after the start of the transport the real movement data of the transports can be checked for differences. To further increase supply chain security, additional sensors inside the cargo hold (acoustic, thermal, electromagnetic) can detect any illegal interference based on plausibility criteria and, initially for the freight forwarder as owner, then also document it in a way that can be used in court. The more extensive and specialized the data is collected, the more important the automation of analysis becomes as a routine task: only really confirmed findings of an anomaly should be displayed in the system and brought to the attention of the users (driver, freight forwarder, police, judiciary).

The freight forwarder as the owner of the data can determine the use of the data for multi-level, automated alerts in general or on a case-by-case basis - with the inclusion of publications and/or police reports for several months up to prediction by location, time, weather.

## **Results**

<b>Target Group</b>	FRADI addresses truck and trailer manufacturers, industry, medium and large enterprises, transportation companies, homeland security policy makers. Existing models of reconnaissance (hermeneutic cycles) lead via adaptations to tight control of the supply chain from loading to handover - and shall thereby stabilize it.
<b>Task</b>	In a specific case, the system is to correlate the planned routes with the actual navigation data and the data on available and bookable parking spaces. From the collection and plausibility-controlled processing of sensor data, the system comes to the analysis of an actual attack and, as specified by the shipping company, to the alerting.
<b>Case Analysis</b>	<p>The many individual cases are to be archived and added up in the system - and compiled into regular reports, whereby reliable data from the past leads to the prediction of future threats.</p>
<b>Task</b>	These standard assessments, in their majority without findings, must be automated and carried out in the background, as well as summarized into location-based statistics.
<b>Cyclical Analysis</b>	Customs and law enforcement agencies can incorporate the data of recorded license plates to optimize the strategy, which allows scouts and attack groups to be convicted with regard to their cooperation - and thus the formation of criminal organizations.

## ***Directly Affected Organizations***

<b>Industries</b>	The specific number of organizations and companies affected in Germany is highly variable and is by no means limited to the globally operating companies. It initially includes all participating forwarding companies, their transport insurers and associations.
<b>Target Group</b>	Logistics, transport companies, transport insurance, the government with customs, police, prosecutors and courts.