Fraunhofer IML

Fraunhofer Institute for Material Flow and Logistics IML

Collaborative management for dangerous goods

A blockchain-based, digital solution approach for dangerous goods processing

Blockchain-based dangerous goods processing

The handling of dangerous goods – is a highly legally regulated discipline within the logistics sector which requires the collaboration of many actors, to ensure the protection of people and the environment from the properties of the transported goods, such as flammability or toxicity. A non-compliant handling of dangerous goods can cause significant risks for the environment and health and can therefore result in severe penalties. Even though the transport of dangerous goods per definition involves risks, the demand for transport has increased significantly in recent years. About 149 million tons of dangerous goods were transported on Germany's roads in 2018 – the trend is increasing (Federal Statistical Office, 2018).

Challenges

Logistical processes, such the transport, the storage and the handling of dangerous goods, are subject to strict legal regulations and a high level of documentation requirements. The accompanying documents required for the transport of dangerous goods are often still exchanged in paper form. This complicates an efficient exchange of information and can lead to missing or incorrect data. The fact, that more than 20% of all detected violations during the transport of dangerous goods are directly related to the transport document, illustrates this problem (Federal Logistics and Mobility Office, 2021).

Technical principles and solution approach

Besides keeping transport data continuously up to date, ensuring of sensitive data, which is currently still frequently exchanged in a paper-based manner, is a major challenge in the handling of dangerous goods processes. The blockchain technology represents a promising approach towards the digitalized and automated handling of dangerous goods processes. Here, information is stored decentrally in encrypted and interlinked data blocks, and thereby realizes a trustworthy, tamper-proof, traceable and transparent flow of information between the directly involved actors according to their individual access permissions. This technical solution also makes it possible to minimize time-consuming preparations for the transport of dangerous goods and at the same time increases flexibility before and during the transport of dangerous goods.

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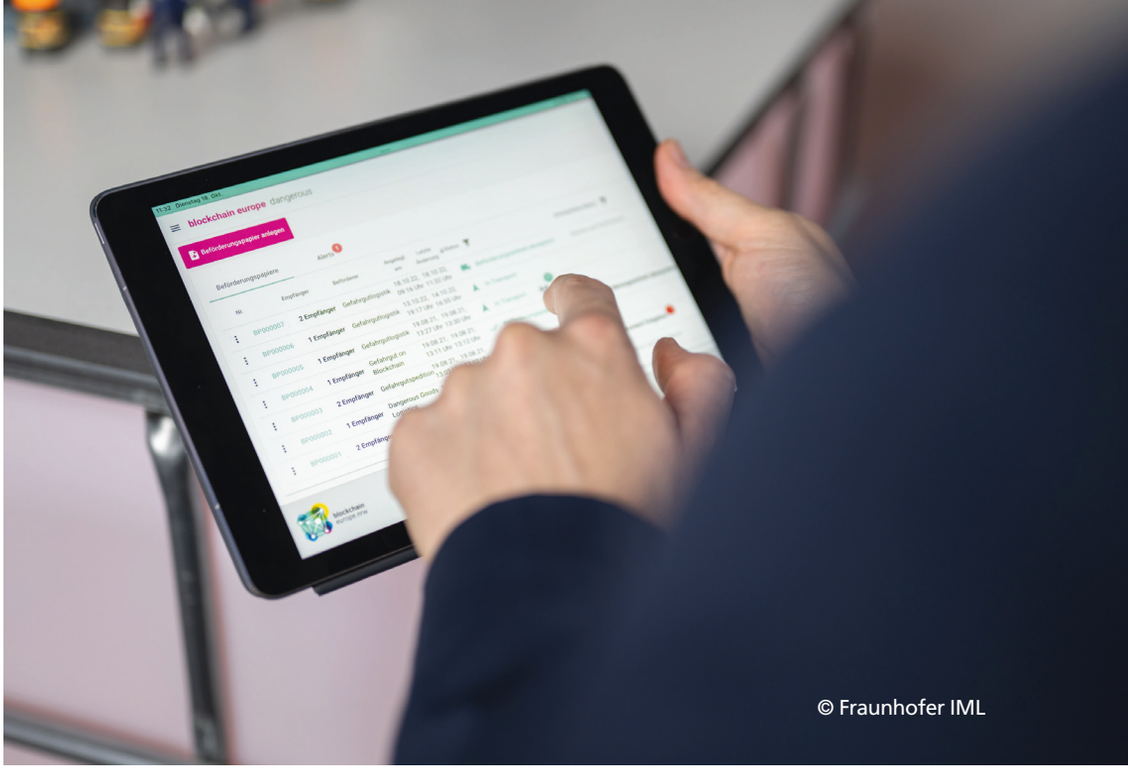

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Potentials and benefits

- Digitized and automated processes
- Tamper-proof and trustworthy
- Persistent and consistent documentation
- Focused and specific transparency
- Raised flexibility
- Increased process efficiency
- Traceability
- Reduced resource consumption

Our competences and services

Besides professional and technological expertise and long-time experience in project management and project leadership, the Fraunhofer IML, Project Center "Traffic, Mobility and Environment", as well as the department "Procurement & Finance in Supply Chain Management" have methodological expertise

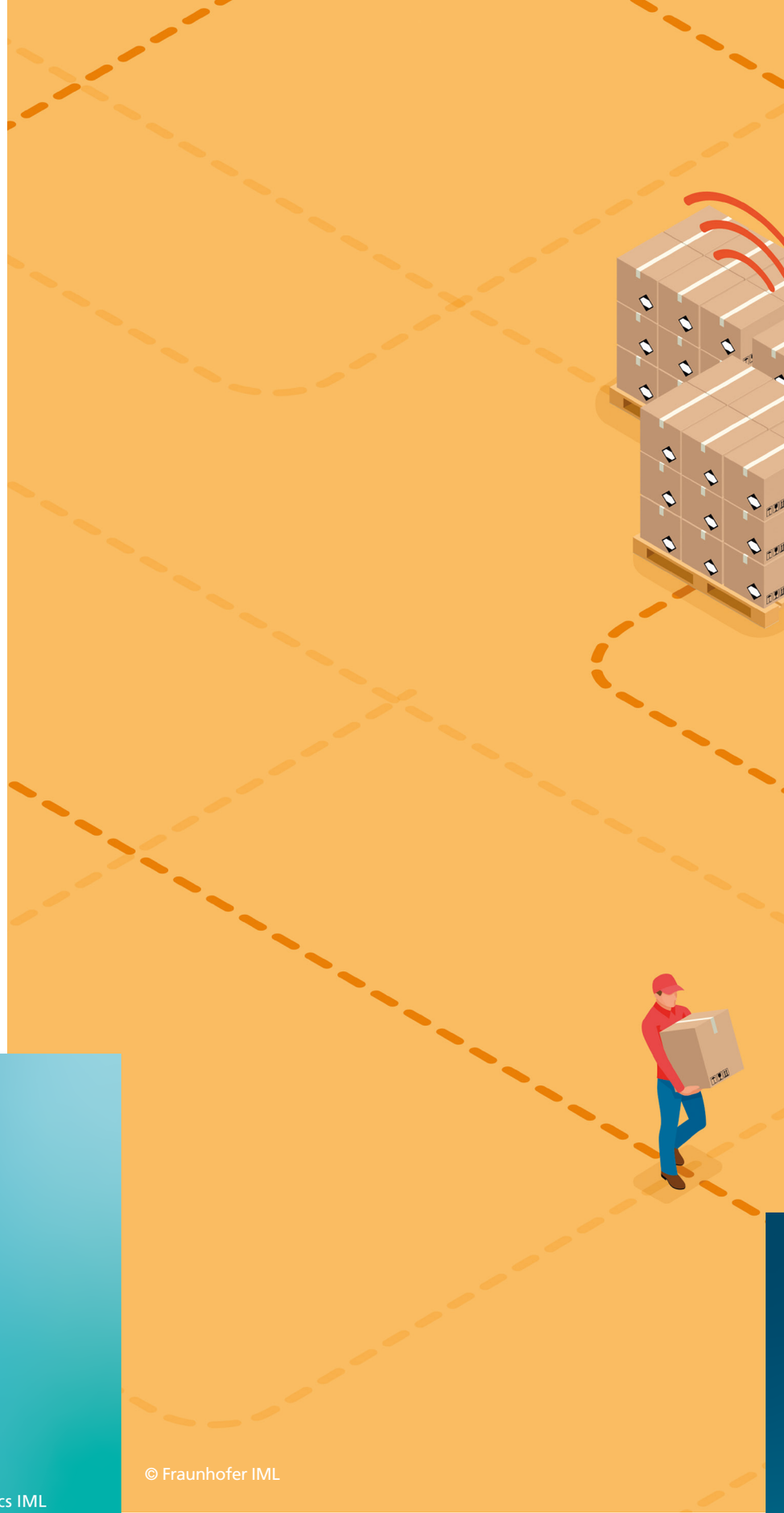
- to conduct independent studies and market/potential analyses,
- to utilize and assess new technologies,
- to plan and implement agile development projects, and
- within the concept design, the requirements definition and the process recording & analyses.

Consulting and concepts for safety in traffic

- Digitalization and automation in the transport and traffic sector
- Information and data management for dangerous goods transports
- Increased traffic safety through the use of specific technologies and connected systems
- Smart locating and emergency call systems
- Usage of technologies for safety and rescue

New technologies and concepts to improve the exchange of information

- Technology Screening and Deep Dive
- Identification, development and testing of blockchain-based business models
- Application piloting in logistics, procurement, and finance
- Connecting physical and financial supply chains
- Automation of billing and payment processes



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