

# **open logistics.** magazine

// GET INVOLVED: THE FUTURE OF LOGISTICS IS OPEN SOURCE

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### Imprint

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**Realisation:** mehrzeiler & kollegen, Oberhausen **Printed by:** Flyeralarm, Würzburg

**Cover illustration:** freepik.com

une 2025

### doi 10.5281/zenodo.15282270



All issues of the Open Logistics Magazine are available online as e-papers. Register and we will be happy to send you the latest issue and all subsequent ones via e-mail or as a printed version.

## Welcome

For logistics, open source software development is no longer a niche topic but a mainstay of technological innovation. The start of an open source project is therefore usually marked by great enthusiasm, with many new ideas, supported by a motivated community of developers working together on something big. Once the software is ready for industrial use – for example, as the Open Logistics

Foundation has now demonstrated with the eCMR digital consignment note – another crucial project phase begins: the use and maintenance of the software. This shows that open source is not a sprint but a marathon.

This is because an open source project is successful not only because

of the innovative power or solution expertise of the software developed but also because of its longevity and ability to adapt to changing conditions. This means, among other things, continually fixing bugs, adding new features, and keeping the software secure and compatible. Successful open source projects are not a one-way street – they thrive on the feedback and active participation of users, who feed back their improvements and enhancements. After all, open source is not a consumerist attitude, but part of a sharing culture that, as in other areas, requires a sophisticated governance structure. Developing open source software is as difficult as maintaining it. A stable infrastructure, reliable documentation, and clear responsibilities are essential to ensure the quality and maintainability of open source software in the long term. Long-term institutions such as the Open Logistics Foundation provide exactly that and use their members' contributions accordingly.

The first of the terms accordingly. We are delighted that our community continues to grow: companies that want to develop and use solutions and network partners who build bridges with us and fill (knowledge) gaps. The interest is great. The more users integrate the software developed by the Open Logistics Foundation into their systems, the faster and

> better we will achieve our common goal of de facto standardisation of logistics and uniform process landscapes in digital value chains.

> So, let's look at open source as a strategic investment and discuss how we can work together to ensure the longevity of our software within vibrant communities.

### Carina Tüllmann

COO at the Open Logistics Foundation

# Reaching the goal faster, together: **The eCMR conquers logistics**

The software for the eCMR, developed by member companies within the Open Logistics Foundation, provides the long-demanded basis for the **digital and efficient organisation** of international goods transport. The key to success for this new open source standard is collaboration – and the logistics sector is now ready to accelerate its efforts with the eCMR.

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Tablet instead of clipboard: In developing the new open eCMR software, members of the Open Logistics Foundation ensured that the solution would be just as easy to use as the tried-andtested paper version.

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## OPEN SOURCE HAS PROVEN ITSELF BOTH AS A TECHNICAL DEVELOPMENT MODEL AND AS A COLLABORATIVE APPROACH TO TEAMWORK.

The fact that freight processes today still largely follow traditional, paper-based procedures, is no coincidence. "Paper has seemingly always been around – and it is, still, easy to handle," says Jonas Kassan, Team Lead at the Global Project Management Office at Rhenus. However, as the lead of the "Electronic Transport Documents" Working Group in the Open Logistics Foundation and its "eCMR" project, he doesn't see this as a case for defending the conventional consignment note. Ouite the opposite: His motivation was to create a digital solution for the document that is just as intuitive for all participants to use. And a digital solution is urgently needed: While paper-based processes may appear simple, they cost time and resources - on all sides, and for all involved. The eCMR, which is



The Open Logistics Foundation presented the proof of concept for the eCMR at a press conference at the end of 2023.

the electronic version of the traditional consignment note that enables paperless processing of goods transport, offers advantages such as faster handling, fewer errors and increased transparency.

### **Community counts**

The new ready-to-use software for the digital consignment note is no accident, but the result of a collective effort envisioned by the founders of the Foundation in 2021. "We see IT as possibly the most important driver of innovation today - for our sector and beyond. We are convinced that we can only achieve digitalisation in logistics together. Connectivity, compatibility and interoperability of IT systems in logistics beyond company boundaries is our clear objective," says Dr. Stephan Peters, Chairman of the Board of the Open Logistics Foundation and board member at Rhenus. "The development of the eCMR shows how powerful we are as an industry when we drive innovation together." Rhenus, along with Dachser, DB Schenker and duisport, is a founding member of the Foundation, and the digital consignment note is its first lighthouse project. It is intentional that the software developed via the Open Logistics Foundation is available as open source, as Stefan Hohm, board member of the Open Logistics Foundation and CDO at Dachser, explains. "Open source simplifies access to digitalisation and drives the standardisation of commodities within digital value chains."

For the eCMR, open source has proven itself not only as a technical development model, but also as an expression of the power of collaborative action. "Of course, Rhenus could have solved the task technically on its own, but only within the group could we create a legally and organisationally accepted solution," says Markus Sandbrink, CIO of Rhenus, describing the benefits of joint development. The eCMR is based on a standard process in logistics. For such so-called commodities, companies today still all too often develop their own solutions – instead of pooling their efforts with other companies as in the Open Logistics Foundation.

The diverse composition of the Working Group and project is one of the key success factors of the new eCMR: More than 25 logistics service providers, transport platforms, as well as logistics and IT service providers - many of them companions in the industry, some with existing individual eCMR solutions – worked together on the new standard. The software benefits from considering many different perspectives. The participating companies also represent numerous European countries. Their representatives contributed valuable insights on national regulations and specifications that are crucial for an international solution. RA Dr. David Saive, LL.M., Legal Product Owner at the Open Logistics Foundation, accompanied the project and ensured legal compliance of the software alongside technical development.

### **Compatibility inside**

In recent years, various companies, transport platforms, and logistics IT service providers have repeatedly tried to digitalise the CMR consignment note. As a result, a variety of software and solutions emerged. Their shared problem: compatibility. Different systems and standards make seamless data transmission and processing difficult. In practice, this often leads to participants having to revert to paper or keep it in parallel. Broad market adoption failed to materialise.

With the eCMR from the Open Logistics Foundation, the goal of unified compatibility in the transport sector is now within reach. The new open source software establishes a common standard for the digital consignment note – not a formally certified one, but a de facto or industry standard, legitimised by collective development and business support. At the same time, the eCMR contributes to cost savings through more efficient processes.

### **Shorter waiting times**

By the end of 2023, Dachser and Rhenus had provided the "proof of concept" for the eCMR on a real transport route. This was followed by actual software development within the project.



### **Project eCMR**

The eCMR project – part of the Working Group Electronic Transport Documents – began its work in October 2022.

### **Participating members**

Aventeon, Blue Yonder, Cargo Sign, CargoLedger, Collect + Go, Dachser, DB Schenker, DSLV, duisport, Editel, Fraunhofer IML, Gebrüder Weiss, GSI Germany, iteratec, LKW WALTER, Markant, Pionira, Rhenus, Sitra, TradeLink, Trans.eu, TransFollow, Translogica, Transporeon, TriNet, Zekju, Zufall As of May 2025

**Project leaders** Dachser, Rhenus

### **Use Cases**

Following the proof of concept on two routes between Rhenus and Dachser, the industry-ready software has now been rolled out as part of two joint use cases. The logistics service providers Dachser and Rhenus collaborated with the logistics IT companies Markant and Blue Yonder.

## THE LEGAL SECURITY OF THE HANDOVER PLAYED A CRUCIAL ROLE IN DEVELOPING THE OPEN ECMR SOFTWARE.

Logistics service providers associate a variety of benefits with the eCMR. Faster processing of lorries during handovers – whether at the sender or recipient – is one of them. According to Ingo Müller, Department Head of Prototyping & Testing at Dachser, time savings in some reference cases have reached up to 60 percent. "This means significant relief for everyone involved in the transport chain – from drivers and dispatchers to the recipients of the goods," explains Müller, who co-leads the "Electronic Transport Documents" Working Group and the "eCMR" project with Jonas Kassan. "By digitalising freight documents, we significantly reduce waiting times and enable more efficient processing."

Just how great the optimisation potential is becomes clear when looking at current procedures with traditional paper documents. The sender hands over the consignment note – an original with three carbon copies – to the carrier. Both parties sign: The sender to confirm handing over the goods, the carrier to confirm receipt – thus forming the transport contract. One copy stays with the sender, the original and two others travel with the shipment. At the recipient's end, the same process occurs: The carrier confirms delivery on the consignment note, the recipient confirms acceptance. All of this happens in seconds with the eCMR – thanks to an innovative and, crucially, legally compliant signature solution.

### Legally secure handover

The eCMR does not rely on the electronic signature, which would correspond to the analogue personal signature customary for consignment notes today, but on the advanced electronic seal. The advantage: Advanced electronic seals are not tied to natural persons but represent legal entities – companies and organisations. For example, when the tax office seals an electronic tax notice, it is clear that the document originates from the authority – who technically triggered the seal does not matter. The electronic seal essentially functions like a trusted company stamp, usable only by expressly authorised employees. From a technical perspective, advanced electronic seals and advanced electronic signatures are quite similar. Both use digital signatures based on secure cryptographic processes and certificates.

Had the previous analogue process been directly transferred into the digital world, every employee would have required their own certificate for digital signature – a considerable administrative burden. The advanced electronic seal simplifies the process: Employees can identify themselves through their affiliation with the company and thus securely authenticate the electronic consignment note. Moreover, the advanced electronic seal can easily be integrated into existing digital employee management systems, which are already widely used today in large European enterprises.

For the technical implementation, the Open Logistics Foundation involved experts from ecsec GmbH (see interview on page 11). This company specialises in innovative solutions in information and communication technology security, security management, smart card technology, identity management, internet security and electronic signatures. Its expertise stems from decades of

## THE ECMR SOFTWARE IS JUST AS EASY TO HANDLE AS THE PAPER DOCUMENT.

Jonas Kassan, Rhenus



experience in international research and industrial projects. The use of the advanced electronic seal complies with both the eCMR protocol and current European legal regulations on digital identity.

### More efficient processes

Alongside the time savings during processing, Jonas Kassan of Rhenus sees another major benefit in the invoicing process: Until now, the sender could only issue an invoice after receiving the original paper consignment note back – a process which could take weeks depending on the recipient's processing time and postal delivery. Both sender and carrier must wait for their payment. With the eCMR, this process is greatly accelerated: As soon as the recipient digitally confirms receipt of the goods, the confirmation is transmitted to the sender's system in real time – and the invoice can be issued immediately.

"For Markant customers, the eCMR is of crucial importance because this 'electronic' document is another building block enabling fully paperless deliveries. Automation based on structured data offers enormous savings potential for sender, freight forwarder and recipient," explains Reiner Sailer, Lead Service Owner at Markant Services International GmbH. The company, a member of the Open Logistics Foundation, specialises in digital transformation and automation within the FMCG and retail sector's value chain – particularly for suppliers and retailers in grocery, wholesale and specialised retail. "By simplifying logistics processes, the eCMR makes a vital contribution to strengthening resilient supply chains - especially in the FMCG sector," says Sailer. Particularly promising for the company is the expectation that the eCMR will provide a much broader data basis on the transport process than before. These additional insights offer the Markant Group new opportunities to develop value-added services for its clients.

However, the eCMR offers benefits not only for invoicing but also for improving the traceability of goods during transport. Until now, shipments have often gone off the radar – especially in the case of part loads or when passing through intermediaries. This regularly results in queries from recipients and significantly increases communication efforts for logistics service providers. As Jonas Kassan succinctly puts it, "That's when the phone calls start." With eCMR, the sender always

### From CMR to eCMR

The CMR consignment note in international road freight transport is a civil law document that primarily serves as proof of the transport contract between sender, carrier and recipient. It defines rights, obligations, and liabilities, and acts as prima facie evidence in disputes. At the same time, it plays a crucial role in public law contexts. Authorities use it to monitor cabotage compliance, ensuring foreign carriers adhere to domestic transport regulations. It is also required for customs clearance, tax audits and security checks.

The additional protocol to the 2008 CMR Convention (eCMR Protocol) allows for the use of an electronic consignment note (eCMR), which carries the same legal validity as its paper counterpart. This digital version must ensure authenticity, integrity and accessibility via secure IT systems and electronic signatures. The Open Logistics Foundation has guaranteed exactly this in the development of its eCMR software.

Comprehensive information on the legal security of the eCMR software can be found in the "Legal Factsheet".



/\* Download factsheet \*/ has precise information about the location of the goods and can provide accurate updates to their customers.

Another cost advantage stems from eliminating paper – both as a material and in terms of its transport. But Jonas Kassan from Rhenus takes it a step further. Looking at archiving, "The CMR must be retained for ten years. At Rhenus alone, the paper fills hundreds of square metres of basement storage. And if a document actually needs to be checked, finding it is a huge effort...".

The eCMR eliminates these problems: Switching to the digital waybill not only saves time, it also saves money. Rhenus, for example, has calculated that, depending on the use case, savings of up to one euro per document can be achieved. Processes become more transparent and less error-prone – from start to finish. This figure aligns with calculations by other logistics service providers, some of whom cite savings of up to  $\notin$ 4.50. Transport platforms, such as member company Transporeon, even offer a calculator on their website that allows companies to determine how much they can save per consignment note by using the eCMR.

### **Next phase: Implementation**

Logistics service providers Rhenus and Dachser have now integrated the eCMR into their IT systems as part of two use cases and are deploying the digital consignment note on their routes. It is not only the internal demand from branches and sites that is driving adoption, but also the growing demand from customers. In these two use cases, the logistics service providers collaborated with logistics IT service providers Markant and Blue Yonder, who actively supported or accompanied software development in the Foundation's eCMR project.

Blue Yonder, also a member of the Open Logistics Foundation, enables companies to make more accurate forecasts and dynamically manage capacities, inventories, and transport via its AIdriven supply chain platform. "Working closely with a logistics provider on a real-world application sharpened our understanding of the industry's requirements and at the same time paved the way for future innovations," says Robert Recknagel, Head of Operations at Blue Yonder. The company plans to use the new or real-time data from the digital process to help its clients manage their supply chains more quickly and precisely. However, de facto standards like the eCMR do not become established overnight – unlike regulations that are mandated with a fixed deadline.

### **Adoption in waves**

Jens Leveling, Technical Advisor to the Open Logistics Foundation and Team Lead for Data Driven Logistics at the Fraunhofer Institute for Material Flow and Logistics IML, is well aware of this. The first components for the eCMR were developed at the Fraunhofer IML as part of the large-scale "Silicon Economy" research project, funded over five years by the Federal Ministry for Digital and Transport, and were published in the Open Logistics Repository. The institute also initiated the founding of the Open Logistics Foundation and brought the founding companies together. It remains a strategic partner of the Foundation to this day.

Jens Leveling has accompanied the development of the eCMR software both from a research perspective and in practice. The software architect expects a "wave-like spread" of the open source standard. "Each new wave is triggered when a major player in the market adopts the software," he said. "That player naturally brings their customers along – including many smaller businesses." This results in growing interconnection between companies and platforms.

Transport platforms could also play a key role in driving the adoption of the standard. It initially surprised some observers that several of them actively contributed to developing the eCMR software as members of the Open Logistics Foundation. One example is the multinational logistics software provider Transporeon, which has been offering its own digital consignment note solution since mid-2023. Has the company created more competition for itself in the market by participating in the Foundation's eCMR project, thereby harming its own business model?

## WITH THE ECMR WE SIGNI-FICANTLY REDUCE WAITING TIMES AND ENABLE MORE EFFICIENT PROCESSES.

Ingo Müller, Dachser



## The future of authentication

3 questions for Dr. Detlef Hühnlein, Founder and Managing Director of the signature expert ecsec.

The seal component of the Open Logistics Foundation's eCMR software is based on advanced electronic seals. What exactly does that mean?

The eIDAS Regulation - short for "electronic IDentification, Authentication and trust Services" – is a regulation of the European Union that governs the legal framework for digital identities, electronic signatures, seals, and trust services across all of Europe. Article 36 of Regulation (EU)

No. 910/2014 sets out the reguirements for an advanced electronic seal. For example, it must be uniquely linked to the creator of the seal and enable the identification of the seal's creator.

### What distinguishes the eCMR solution?

The advanced electronic seal is linked to a com-

pany's identity using established and internationally recognised standards, such as ETSI TS 119 182-1, while the seal components are based on the identities of the employees. ecsec applied a "blueprint" it developed itself, which has already proven effective in many cases with public authorities, organisations, and industry; and adapted it - in close coordination with the Open Logistics Foundation and those responsible for the eCMR project - to the specific professional requirements of the logistics sector. Advanced electronic seals ensure the integrity of the eCMR by cryptographically linking the seal to the eCMR data to be sealed. Any subsequent

and unauthorised change to the eCMR is immediately detected. This also meets the requirements of Article 36 of the eIDAS Regulation. As a result, the eCMR is significantly more secure than paper-based CMRs. If required, the advanced electronic seal can even be traced back to the individual person who triggered it.

### How future-proof is the solution?

The eCMR is a very important initial

use case for the server-based

HÜHNLEIN

European Business Wallet (EUBW), which is already available today as a complement to the smartphone-based European Digital Identity Wallet (EUDIW). After all, what better way to match the European Union's aim of promoting cross-border cooperation within the European

Single Market than the eCMR, which helps build interoperability between digital economies in a trustworthy manner?

Dr. Detlef Hühnlein is the Founder and Managing Director of ecsec GmbH, a company specialising in innovative eIDAS solutions, and is responsible for the technical implementation of the sealing solution for the eCMR.

// ecsec

THE OPEN LOGISTICS FOUNDATION IS NOW COMMITTED TO THE DISTRIBUTION AND FURTHER DEVELOPMENT OF THE ECMR SOFTWARE.

The answer is a clear no. "In logistics, there are too many isolated solutions on the one hand, and on the other, high barriers to data sharing. As a result, the benefits of digital solutions are only accessible to a few – and even then, not to the full extent," says Serge Schamschula, Head of Ecosystem at Transporeon. "In this sense, large platforms and their users also benefit when shared standards help software solutions reach a wider audience."

The eCMR software of the Open Logistics Foundation is not only available to companies that helped develop it or are members of the Foundation. Any company can download the software and its components from the Open Logistics Repository, customise them, and use them. Both downloading and using the software, including for commercial purposes, are free of charge. Companies with in-house IT departments can integrate the software into their existing systems themselves. Businesses without internal IT resources can engage external IT service providers. Installation takes only a few hours. Customisation, however, requires more expertise and time – depending on the changes to be made. This creates a large market for consulting and implementation services. IT providers involved in the eCMR project are especially well suited for such projects. They can set up, operate, and maintain individual instances for companies.

Although the Open Logistics Foundation's eCMR software is now available in a ready-touse version, development is far from complete. Like any software, long-term operation requires regular updates to ensure continued functionality. This is because operating systems, devices, and other software environments interacting with the eCMR evolve, and the software must be adapted accordingly. At the same time,



new security risks emerge, necessitating continuous security updates. Despite comprehensive testing, unforeseen bugs – just as in proprietary software – can never be completely ruled out and must be fixed. Over time, opportunities also arise to make the software more efficient, faster, and more stable. To support companies that want to develop new use cases, the Open Logistics Foundation's Head Office has established a dedicated task force. User feedback plays a central role. "Every company that uses the eCMR software is asked to provide feedback to the Open Logistics Foundation," says Ingo Müller from Dachser. "These suggestions are incorporated into future updates or are implemented directly by the community."

#### **Collective progress**

Every open source project also thrives on collaborative progress, and the Open Logistics Foundation actively encourages it. Modifications or extensions to the software by users are not restricted. Companies may use the software without limitation under the Open Logistics Foundation License – even to expand their service portfolio and monetise related offerings. This also applies to new features developed by companies. The base – i.e. the core standard that ensures compatibility – should, however, not be changed without compelling justification.

For the Open Logistics Foundation and its projects, it is essential that companies make their enhancements and new functionalities accessible to the open source community. These contributions can be submitted through the Contribution Process set up by the Foundation (see page 20). How much an entire industry can benefit when many companies participate in a development effort is demonstrated by the example of the Linux operating system, which has grown into a stable, secure, and versatile solution through collective expertise.

#### Joining forces

Logistics is a diverse industry with many players and many different structures. But one thing unites them: The drive for digitalisation and sustainably efficient supply chains. "The potential that open source solutions offer for logistics is immense," agree Dr. Stephan Peters and Stefan Hohm. "Let's take the eCMR as our starting point – join the Open Logistics Foundation and let's work together on building an efficient digital logistics landscape for the future!" </>

### One software, two versions

At the heart of the new eCMR software is the eCMR instance, comprising the frontend as well as the backend and the APIs for importing/exporting data and authenticating users:

• The **"Full version**" is aimed at logistics service providers and transport companies wishing to set up their own eCMR instances for the first time.

• The "Core version" is of interest to companies that already have their own eCMR instances but wish to use the interface – for example, transport platforms. The eCMR software from the Open Logistics Foundation can also be used alongside eCMR software from other providers to expand a company's own service portfolio.

An overview of the versions and software components can be found in the "Technical Factsheet" on the eCMR.



/\* Download factsheet \*/



All information is available to interested companies in the short brochure "OLF-eCMR: The new open source standard for the digital consignment note."



/\* Download document \*/

# **EU Data Act:** Challenge or opportunity?

What the European Union's **new regulation** means for logistics – and the role of the Open Logistics Foundation. According to a study by the European Commission, only 20 percent of industry data is used and exploited. The European Union's Data Act aims to improve the use and sharing of data to strengthen Europe's data economy. The regulation, which came into force in 2024 and will be directly applicable across the EU from September 2025, includes provisions on data access; data sharing between businesses, between businesses and consumers, and between businesses and public authorities. For Raoul Wintjes, Head of International Road Haulage & Digitalisation at DSLV Federal Assoc.

Further Reading: The article "Data Act: Attack and Defence Vectors in Logistics Data Exchange" by Raoul Wintjes and Merlin A. Müller, published in the specialist journal LogR Logistik & Recht. for Freight Forwarding and Logistics Germany, which is a member of the Open Logistics Foundation, the Data Act is both a challenge and an opportunity for companies, but in any case a "strategic turning point": "On the one hand, companies

must ensure that their trade secrets are protected, and on the other, they must explore the opportunities that lie in cross-modal optimisation in particular."

### Strategy is needed

With this in mind, lawyer RA Dr. David Saive, LL.M., Legal Product Owner for the Open Logistics Foundation, recommends that companies quickly develop a strategy for compliance with the new data sharing regulations. This should include five key points: identifying affected devices and relevant data and obligations; establishing data access and sharing policies; implementing cybersecurity measures; reviewing existing datasharing agreements ; and exploring open source data management solutions. "A structured approach helps companies avoid legal risks and competitive disadvantages," says the logistics law expert. For David Saive, the opportunities for logistics are clear: "The law aims to (also) facilitate data exchange in the supply chain, improve operational efficiency and promote innovation – and this is where the opportunities for companies lie. The mandatory access to data will enable logistics service providers to optimise processes, drive innovation and increase their competitiveness – or, to be more precise, to optimise multimodal transport, improve stock forecasting and speed up their own processes overall.

### Standards help everyone

The Open Logistics Foundation can also play an important role in implementing the Data Act. On the one hand, standards are necessary for the success of the regulation, and on the other hand, data exchange is a classic commodity – a service that does not allow companies to increase their turnover or add value to their customers. The Foundation can, therefore, support the industry by developing cross-industry data sharing agreements, aligning with EU interoperability standards and providing open source solutions for compliant data exchange. "Companies that are interested in such open source projects and can imagine developing them together with other companies can always contact us," says Andreas Nettsträter, CEO of the Open Logistics Foundation. "If companies work together to create a trusted ecosystem, it will help everyone navigate the new regulatory landscape and unlock the full potential of datadriven logistics - the Open Logistics Foundation was created for projects like this." </>

### DATA EXCHANGE IS THE FUEL OF MODERN LOGISTICS. COMMON STANDARDS ARE OUR NAVIGATION SYSTEM.

Raoul Wintjes, DSLV

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# **Open source is** "ready for take off"



The **diversity and sheer number of players** in the air cargo industry make the digitalisation of the industry more difficult. Together with IATA, the Open Logistics Foundation now aims to improve access to **new standards and solutions** while building an open source community.

### **OPEN SOUCE SOFTWARE** CAN HELP OVERCOME FRAGMENTATION IN THE AIR CARGO INDUSTRY.

More transparency, efficiency, and sustainability: Open source can make a decisive contribution to the digitalisation of the air cargo sector. A standardised, open IT infrastructure simplifies and accelerates data exchange in an industry where many players often operate with differing IT systems and processes. Specifically, digital tracking and tracing solutions create real-time transparency across supply chains, standardised APIs or software modules enable seamless digital communication and reduce the effort required to integrate disparate systems. In principle, open source solutions can also help develop more climate-friendly transport options. Especially in times of crisis, they enable the rapid adaptation of supply chains. In short, "The potential of open source in air cargo is enormous, and the time to harness it is now," says Andreas Nettsträter, CEO of the Open Logistics Foundation.

Arnaud Lambert, ONE Record Engagement Manager of the IATA, confirms this. For Lambert, there is no doubt that the air freight industry must utilise open source: "Open source enables us to master digital transformation, even with limited IT capabilities, and to advance networking, standardisation, and automation with greater momentum. When industry players collaboratively develop open source software that is freely available to all, we can succeed in overcoming the industry's fragmentation."

### **Unified solution for One Record**

Work is already underway within the Open Logistics Foundation: Member companies from the industry founded the Working Group "Digital Air Cargo" to make air cargo more efficient and to enable new applications and solutions. The focus of the Working Group's first project - "NE:ONE" - is the data exchange standard One Record, developed by the International Air Transport

Association (IATA). One Record aims to overcome the fragmentation of freight information in the air cargo industry by consolidating all relevant data related to a shipment - such as air waybills, freight documents, custom declarations - into a single digital dataset. In the NE:ONE project, an open source software was created based on developments from the project "Digital Test Field Air Cargo (DTAC)," funded by the Federal Ministry for Digital and Transport (BMDV). The goal was for One Record to not be implemented in many individual variants but instead to create a uniform solution for all freight companies.

### Industry continues to develop standards

The open source software is now published in the Open Logistics Repository, making it available to all stakeholders. They can freely download the software, integrate it into their IT landscapes, and adapt it. The more companies use this solution, the better and more effectively the industry can advance its digitalisation. The engagement numbers in the repository show that companies have already recognised the value of this tool.

During the IATA One Record Hackathon in Dublin in the spring – where it participated as a partner for the first time – the Open Logistics Foundation called on companies to actively continue developing the software and regularly provide updates and bug fixes. In this way, the entire industry can benefit from continuous improvements and ensure that the software remains relevant for everyone in the long term.

However, the Open Logistics Foundation does not want to build solely on the NE:ONE software.



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Illustrationen:



At the World Cargo Symposium in Dubai, the Open Logistics Foundation promoted the creation of a new air cargo open source community.

In its new IATA-supported initiative for the use of open source technologies in air cargo, the Foundation invites companies to become members and realise their own digital solutions – from uniform interfaces for data exchange between airlines, carriers, and customs authorities to open source platforms for tracking, documentation, or automation. To support this, the Foundation offers the participants a neutral platform for idea exchange and regulated, competition-compliant collaboration. This is especially important when competitors are working together on a project.

One of the major challenges in the air cargo industry is the high regulatory and safety requirements. Digital solutions must be compatible with

### WE, TOGETHER WITH IATA, HAVE SET OURSELVES THE GOAL OF IMPROVING DIGITAL STANDARDS IN AIR CARGO OPERATIONS FOR EVERYONE.

Carina Tüllmann, Open Logistics Foundation



strict regulations on security, customs, and the environment. The Open Logistics Foundation is aware of this, so software development is accompanied from the outset by a Legal Product Owner who ensures that all technical solutions comply with legal requirements.

#### **Closing gaps in digitalisation**

At the World Cargo Symposium in Dubai, Andreas Nettsträter and Carina Tüllmann of the Open Logistics Foundation, once again promoted the initiative. In their presentation on "Global Open Source Community for Digital Freight," they explained to an interested audience the importance of a global digital cargo community and how it improves collaboration and efficiency in the industry. "Air cargo is on the path to digitalisation, but there are still major gaps," said Carina Tüllmann. "With our initiative for the use of open source technologies, we can and want to close these - or at least some of them. We hope that many companies will get in touch with us, both the big players and the smaller actors. Because collaborative development works all the better the more roles and perspectives it includes." </>

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### Exchange at eye level

Networking included: The annual Open Source Innovation Days organised by the Open Logistics Foundation are now a firm fixture in the diaries of member companies.

Numerous representatives from companies and organisations took the opportunity in Berlin to network with each other, the Foundation's team and the event's speakers. Their presentations highlighted various facets of the logistics and open source world: RA Dr. David Saive, LL.M., Legal Product Owner at the Open Logistics Foundation, and Sebastian Raible from network partner APELL reported on the EU Data Act and its impact on logistics. Clare Dillon from CURIOSS, a community for Open Source Program Office (OSPO) staff in research, explained how cultural change can be institutionalised through open source. Dr.-Ing. Kerstin Dobers of Fraunhofer IML and Violetta Matzoros of Smart Freight Centre, also a network partner of the Foundation, called for more sustainability – especially as there are now many areas where the legal requirements meet the needs of the industry.

// Open Logistics Foundation



The Open Source Innovation Days are valued by members as a knowledge and networking platform.

APELL, the umbrella association for European open source business associations, is delighted about the new partnership with the Open Logistics Foundation. The OLF embodies openness and makes it clear that openness is the key to achieving progress together – as an industry or even as an entire sector. Together, we will now bring this idea to Brussels and across Europe.

Sebastian Raible, Director EU Government Affairs, APELL



### Where to meet us

We offer a regular Open Consultation Hour, a one-hour online meeting where we introduce the Open Logistics Foundation and provide an overview of current projects. We also organise OS Meetups with companies and organisations across Europe to discuss current logistics and supply chain management challenges that can be solved through cross-company collaboration. You will also regularly find us and our network partners at industry trade fairs and conferences. We look forward to meeting you and informing you about our activities.



/\* Scan for current dates \*/

## Not just there, but in the thick of it

The **source code** of the software created by the Open Logistics Foundation is public: "Developers worldwide are **invited to work on it**," says Andreas Nettsträter, CEO of the Foundation.

The path to an open, innovative and standardised logistics industry is also and especially through the contributions of developers to the open source software created in the Open Logistics Foundation and published in the Open Logistics Repository on the GitLab platform. To date, member companies in particular have actively contributed to software development within the framework of the Foundation's projects. Collaboration has always been based on the technical specifications defined in the projects. Non-member companies can contribute at any time, but their time comes when the projects result in scalable software. At this point, it makes sense for external companies to become involved in further development - be it the development of new functionality or the detection and correction of bugs - and to become part of a community that extends beyond the original companies involved.

To this end, the Open Logistics Foundation has now added a CONTRIBUTING.md to every project on its GitLab – a kind of manual for developers who want to make their own contributions. The Open Logistics Foundation deliberately makes it easy for them to get started: The document fills half a DIN A4 page when printed out. An essential prerequisite for collaboration is that developers transfer the rights to their developments to the Foundation. Therefore, the Open Logistics Foundation's Contributor Licence Agreement (CLA) is directly linked to the CONTRIBUTING. md. Anyone who has completed the formalities and wants to start developing software informs the Foundation of the intended changes and is then authorised. This process applies not only to external companies but also to employees of member companies.

New contributors cannot work directly in the main development thread of the software. Instead, they make a personal copy (fork) – a common procedure in Git that gives developers the most freedom possible. They can then drag its GitLab.

Making it easy to get involved: The Open Logistics Foundation has included a CONTRIBUTING.md file in every project on

that copy into a private area (branch) and edit it there. Git allows multiple branches to be managed in parallel so that multiple developers can work on a file simultaneously. To merge the new or changed code into the official version, the developer submits a merge request to the project maintainer, usually an original project member or Foundation staff member. The maintainer then decides whether or not to merge the contribution into the project.

This is the Open Logistics Foundation's way of ensuring that the common foundation of any development - the standard that the Foundation is always working towards - is maintained. The core of the software will be strengthened and enhanced with new industry-relevant features through collaboration of developers worldwide. In this way, contributors are actively involved in the continuous improvement of the project - and the Open Logistics Repository becomes a virtual, living community as active as the Foundation's network of members. </>

### Three steps to contribute an overview

Step 1: Preparation. Create an account in GitLab, sign the Contributor License Agreement (CLA) of the Open Logistics Foundation and familiarise yourself with the Code of Conduct of the Open Logistics Foundation.

Step 2: Registration. Register with the Open Logistics Foundation, inform the Foundation of the intended changes and have yourself activated.

Step 3: Collaboration. Create a personal copy (fork) of the main development thread. Develop new features here, fix bugs or make adjustments. Create a merge request in GitLab so that your contribution can be incorporated into the software.

## Speaking the same language

From more than 150 different terms to ten unified designations: The Working Group Track & Trace has agreed on fewer, more specific events in track & trace solutions – the path to **a unified model** is clear.

Until now, every logistics company used individual track & trace solutions for their track & trace processes - and each solution speaks a different language, which complicates the collaboration of service providers along the supply chain. In particular, the status terms within the transport process are, as of now, not clearly defined: Track & trace status messages are usually transmitted digitally, but not

labelled uniformly. "Out for delivery," "In transit," or "Shipped" often mean the same thing, but can lead to misinterpretations. Some logistics service providers use more than 150 track & trace events. Subcontractors and logistics service providers often spend considerable effort exchanging information at these events.

Logistics Foundation The overarching goal of the Working Group Track & Trace is the creation of an event, notification, and data model on an Open open source basis. For this purpose, its members began by collecting event designations to

later reduce and standardise them. The Working Group proceeded according to the IT principle of "backwards engineering." Everything was designed starting from the end of the supply chain, from the customer's perspective. What events does the customer want to see? What is really relevant for them? This way, a model could be developed that reflects the actual information

y, but not needed. Af ivery," MARIUS satisf needed. After all, the customer must be satisfied with the logistics process, which is tied to their business process. The partners also agreed to initially consider only direct transport. The goal was to achieve the lowest complexity factor. In close collaboration and feedback loops within the large group, the Working Group agreed on an event model. This is intended to enable optimised data exchange for logistics service providers, subcontractors, and

customers alike.

The standard event model consists of a clearly defined sequence of track & trace events that

represent two central scenarios: The so-called "Happy Path" outlines the ideal transport process along the chain from the handover of the shipment to final delivery using ten terminologies. Logistics service providers start with "Order Confirmed" and "Heading towards loading station." After "Loading arrival" and "Loading departure," the process continues into "Customs." Then it proceeds via "Heading towards loading station" and "Arriving unloading" to completed delivery ("Delivered"), until finally, after the "POD" event, the process is completed ("Order Finished"). The reduced complexity streamlines the process structure and lowers potential costs for the logistics service providers and subcontractors.

Deviations from the regular transport process are represented in an "Unhappy Path" with another twelve terminologies, such as "Wrong Location," "Driver Unavailable," or "Vehicle Breakdown."

#### **Expansion to other scenarios**

The new track & trace event model forms a basic architecture for all players who carry out transport or manage events. Provided as an open source model in the Repository of the Open Logistics Foundation, each company can decide whether to integrate these events into its track & trace system. The current model is aligned with the starting point "Road Transport: LSP & Customer." The goal of the Working Group is to expand the topic of track & trace to further scenarios and logistics disciplines in the future. For this, in addition to desired feedback, ambassadors – those who take the topic outward – are especially important.

Marius Hilb is the lead of the Open Logistics Foundation's Working Group Track & Trace and IoT Product Owner at DB Schenker.

### Sustainable harmonisation

duisport, the owner and operator of the world's largest inland port, the Port of Duisburg, and the IT consultancy BusinessCode are among the companies participating in the Working Group Track & Trace. Together, they aim to fully exploit the efficiency potential of track & trace solutions and provide new digital services in a customer-friendly manner.

As a solution provider specialising in unlocking the value of data in the logistics industry, we have observed that many logistics service providers operate on proprietary data models. This not only creates additional effort for the providers themselves but also for their customers. Within the Track & Trace initiative of the Open Logistics Foundation, we contribute our expertise to address this challenge. The goal is to harmonise digital tracking services for customers as much as possible, enabling logistics service providers to focus on delivering exceptional service and optimising their operations.

Martin Schulze, CEO at BusinessCode

We as a logistics service provider see the lack of standards as one of the biggest hurdles in digital collaboration. That's why we actively support the T&T taskforce – a common standard will massively simplify system integration and cross-company networking.

Alexander Volkmer, Head of Digitalisation at duisport logistics & port services



## Open to the future

Intralogistics is fragmented – it is high time to create common standards through open source.

Warehouse management systems from different providers cannot be used seamlessly without data discontinuities. and mobile transport robots from various manufacturers cannot be jointly controlled. Today, intralogistics faces the challenge of connecting heterogeneous systems, vehicles, and peripheral devices - and thus finds itself at a technological turning point, driven not least by the growing need for automation caused by a labour shortage. To enable companies to collaborate on solutions, the Open Logistics Foundation has launched an open source initiative specifically for intralogistics. In doing so, the Foundation once again fulfils its mission to address logistics in its entirety and all its many facets.

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As in all areas of logistics, there is a distinction in intralogistics between unique selling points and the non-differentiating aspects of a system or product. The latter - the so-called commodities - can be standardised collaboratively on an open source basis. The Open Logistics Founda-

tion's Head Office has already held initial workshops with companies, in which the Fraunhofer Institute for Material Flow and Logistics IML – a strategic member of the Foundation - also highlighted the potential of open source software from a research perspective. The following areas are currently of particular interest for intralogistics: Warehouse management. Depending on their size and requirements, logistics companies use warehouse management systems (WMS) from various providers. All of them include certain core or basic functions that do not serve as differentiating factors in the competitive landscape, such as inventory management, master data management, and the logging of logistical status events. Standardised interfaces could also ensure seamless integration of enterprise resource planning (ERP) and warehouse control systems (WCS) with warehouse management systems.

 Order picking. Manual and automated picking processes often still run in parallel today. Open source solutions could improve data exchange, e.g., based on real-time events, and facilitate the integration of various methods such as Pick-by-Voice or Pick-by-Light.

Goods receipt/goods dispatch. Streamlining processes in this area is another key topic in intralogistics. Goods, load units, and handling units could be represented using a standardised data model, with the information shared across company boundaries. This would also enable improved traceability of shipments and goods.

The list of topics is currently evolving and expanding in line with the interest shown by companies that are not yet members of the Open Logistics Foundation. Companies from all areas of intralogistics are warmly invited to get in touch with the Foundation's Head Office. </>

Nathalie Böhning, Innovation and Project Management, nathalie.boehning@openlogisticsfoundation.org

## Small, but mighty

Whether autonomous cranes or intelligent vehicle fleets: The path to smart logistics is lead through the Open Logistics Repository.

The Open Logistics Foundation's Open Logistics Repository is a library of open source software developed by the Foundation's community. It also contains code that has been donated to the Foundation by research organisations, for example. "This software usually has a specific focus and fulfils a clear task. Such small but effective tools have not yet led to communities in



that guides companies safely through the entire machine learning process. The trained AI model is then immediately ready for use.

Mannheim-based Contargo, one of the world's leading container hinterland logistics networks and a member of the Open Logistics Foundation, has used the ML Toolbox in a research project to automate remote crane control centres using

> artificial intelligence. The automation and remote control of cranes is a promising approach to optimising handling, avoiding bottlenecks and alleviating the shortage of skilled labour. The long-term goal is to develop fully autonomous cranes that can also operate at night. The safety requirements for crane operation are high, as the cranes are operated in open areas without fencing. The ML Toolbox was successfully used in the project to train an AI model to support gantry crane control systems at inland ports from different manufacturers so that obstacles

Cranes move cargo in the terminal, such as here in Duisburg.

logistics – but they are regularly downloaded from the Repository and used by companies and their developers," says Jens Leveling, Technology Advisor at the Open Logistics Foundation.

This is the case, for example, with the ML Toolbox software kit, developed as part of the large-scale "Silicon Economy" research project at the Fraunhofer Institute for Material Flow and Logistics IML. The ML Toolbox is a toolbox for AI-based image processing. With its various algorithms for recognising and locating vehicles or load carriers, for example, companies can train AI models independently. This usually requires highly qualified specialists. However, the ML Toolbox includes a "Guided Training Service"  be they people, trucks or load carriers – can be reliably detected at the terminals.

### **Flexible fleet management**

The open source software libVDA5050++ of the Fraunhofer IML is also a quick win from the Open Logistics Repository. The software fully maps the VDA5050 standard, which aims to standardise communication between driverless transport vehicles and the control system. "Providers can build on this instead of blocking already scarce resources for further in-house implementation," explains Nathalie Böhning, Innovation and Project Manager at the Open Logistics Foundation. </>

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## **Overview:** Our

## **Working Groups and Projects**



The air cargo industry is under increasing pressure to accelerate processes and provide realtime information. The Working Group DIGITAL AIR CARGO aims to make air cargo processes more efficient, transparent, and future proof.



Shipping documents are often inconsistent, fragmented, and difficult to automate. The Working Group ELECTRONIC TRANSPORT DOCUMENTS is developing open solutions for standardised and digitalised handling across company and system boundaries.



The path to climate-neutral logistics requires standardised data and digital tools for measuring and reducing emissions. The Working Group ENABLING LOGISTICS DECARBONISATION is creating open foundations for all stakeholders in the supply chain.



Trust in digital customs data is essential for automated border processes. As a basis for nextgeneration digital customs processes, the Working Group OPEN CUSTOMS BLOCKCHAIN relies on blockchain technology.



Lack of transparency hinders planning certainty, sustainability, and compliance. The Working Group TRACK & TRACE is standardising Track & Trace processes on an open source basis, creating a common digital language for shipment tracking.



The blockchain-based application **BORDER**, from the project of the same name, enables the digital handling of customs-relevant processes.

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The software for the digital consignment note from the **ECMR** project is key to seamless digital logistics processes.



The **EMISSIONS DATA EXCHANGE** project uses the iLEAP data standard as an example to provide an interoperable data model for emissions measurement across the entire supply chain.



The GOODS PASSPORT ID (GPID) project is designed for the rapid identification of critical goods and is specifically tailored to the needs of authorities.



In the **NE:ONE** project, an open source solution is being developed to implement the IATA ONE Record standard for continuous, connected, and open air cargo processes.



### To the website

openlogisticsfoundation.org



### To the repository

git.openlogisticsfoundation.org/explore/ projects/starred