B O O S T L O G   P R O J E C T

D E L I V E R A B L E   R E P O R T

Document identifier:	**BOOSTLOG – D3.2**
Due Date of Delivery to EC	**M 17 – 3 May 2022**
Actual Date of Delivery to EC	**30 June 2022**
Title:	**Impact analyses of EU funding in logistics priority Clouds, KPIs and recommendations (i)**
Dissemination level:	**PU**
Work package:	**WP3**
Lead Beneficiary:	**ZLC**
Other Beneficiaries:	**ICCS, FIT, TUD & ALICE**
Document status:	**Final**
Document link:	**https://www.etp-logistics.eu/boostlog/**

Disclaimer

The BOOSTLOG project consortium consists of:

Part. No	Participant organisation name (short name)	Country
1 (Coordinator)	Alliance for Logistics Innovation through Collaboration in Europe, ALICE AISBL (ALICE)	BE
2	STICHTING SMART FREIGHT CENTRE (SFC)	NL
3	FUNDACION ZARAGOZA LOGISTICS CENTER (ZLC)	ES
4	STICHTING TKI LOGISTIEK (TKI Dinalog)	NL
5	HACON INGENIEURGESELLSCHAFT MBH (HACON)	BE
6	INSTITUTE OF COMMUNICATION AND COMPUTER SYSTEMS (ICCS)	GR
7	Vlaams Instituut voor de Logistiek VZW (VIL)	BE
8	FRAUNHOFER GESELLSCHAFT ZUR FOERDERUNG DER ANGEWANDTEN FORSCHUNG E.V. (Fraunhofer)	GE
9	FIT Consulting SRL (FIT)	IT
10	FUNDACION DE LA COMUNIDAD VALENCIANA PARA LA INVESTIGACION, PROMOCION Y ESTUDIOS COMERCIALES DE VALENCIAPORT (VPF)	ES
11	TECHNISCHE UNIVERSITEIT DELFT (TU Delft)	NL
12	EUROPEAN ROAD TRANSPORT TELEMATICSIMPLEMENTATION COORDINATION ORGANISATION - INTELLIGENT TRANSPORT SYSTEMS & SERVICES EUROPE (ERTICO ITS EUR)	BE
13	LINDHOLMEN SCIENCE PARK AKTIEBOLAG (LSP)	SW

Document History:

Version	Date	Modification reason	Author(s)
0.1	11.4.2022	Draft version	Alicia Martinez de Yuso (ZLC)
0.2	19.05.2022	Input from FIT	Marisa Meta (FIT)
0.3	31.05.2022	Input from ALICE	Fernando Liesa (ALICE)
0.4	06/06/2022	Update with all the input	Alicia Martinez de Yuso (ZLC)
0.5	17/06/2022	Input form ALICE	Fernando Liesa (ALICE)
0.6	27/06/2022	Final draft	ZLC
0.7	29/06/2022	Review from ALICE	ALICE
0.8	30/06/2022	Final version	ZLC

Contents

Definitions of terms used in this deliverable

Term	Definition
Experts	Persons with extensive knowledge or ability in an area of study or work.
Results	The main deliverables, publications etc. out of the projects. For EU Horizon 2020 projects, they are available through CORDIS projects pages
Outcome	Products, services, solutions or knowledge for business or policy applications aiming at addressing Pain Points and other value-added results potentially impacting the market (by creating it or transform it), the Companies operations as well as polices and regulation. Results that could set direction in Companies and Governments are considered Outcomes too.
Implementation Case	A concrete example in which causal links between public R&I funding and technology, organizational or process innovation in a specific logistics area can be established.
Logistics Cloud	A term used in the BOOSTLOG project to refer in a generic way to a freight transport and logistics domain providing flexibility in the way they are defined and addressed.
Innovation Marketplace	A virtual platform that links *Innovation Seekers* willing to solve a problem *(Pain point)* with *Innovation owners (innovators)* that can provide a solution, or with Experts who can unpack the problem and develop solutions

EXECUTIVE SUMMARY

BOOSTLOG project vision lies in transforming European freight transport and logistics innovation ecosystem to perform optimally[1] boosting impact generation out of R&I investment contributing to EU policy objectives[2] and Companies sustainability and competitiveness generating value for society.

This deliverable is devoted to the impact analyses of EU funding in the priority Clouds, KPIs and recommendations; specifically identifying key actions, characteristics and framework conditions that have facilitated reaching impact from R&I investment. Thus, this report contributes to provide insights on the alignments and misalignments of EU Policy objectives, company objectives and associated R&I policies as a starting point and a framework to: i) further complete with the additional cloud reports to be produced, and ii) be discussed with relevant stakeholders and improved accordingly.

The document is divided into two main sections, the first one devoted to analysing and relate Government (Policy and R&I), Companies objectives and sectoral-specific KPIs so clearer links can be established across stakeholders' groups, and the second one to identify key actions, characteristics and framework conditions (e.g. synergies across programmes, calls definition, programme definition) that have facilitated reaching impact from R&I investment.

11 Implementation cases from the Coordination and Collaboration Cloud Report (D2.2) and the Urban Logistics Cloud Report (D2.4) have been further analysed in this deliverable.

COORDINATION AND COLLABORATION CLOUD	URBAN LOGISTICS CLOUD
MIXMOVE	Rome Logistics Living Lab
TRI=VIZOR	Declaration of Intent: Call for zero emission freight vehicles
SMARTBOX	SEUL- Smart Electric Urban Logistics
CRC SERVICES	Padova Cityporto
	VISEVA-W
	Emilia Romagna Permit Portal
	Sustainable urban logistics planning topic guide

These types of implementations reaching impact, i.e. from project outcomes have been identified:

- Commercial products or services exploited by companies as part of their solutions portfolio to address customers (e.g. PTV)
- Transition internal company processes and operations (e.g. UPS)
- New start-ups and companies: CRC-Services, TRIVIZOR.
- Transformative initiative addressing a sector or a market by NGOs/Associations: GS1, TDA

---

[1] R&I systems are complex ecosystems which need various elements to perform optimally. These include a solid public science base producing high quality outputs; strong business participation in innovation activities; fluid and abundant knowledge flows across R&I actors; and good framework conditions that allow business innovation to flourish. European semester thematic factsheet. Research & Innovation. https://ec.europa.eu/info/sites/info/files/file_import/european-semester_thematic-factsheet_research-innovation_en.pdf

[2] namely: decarbonization, emissions and congestion reduction, free and seamless movement of goods and sectorial digitalization capabilities upgrade. https://ec.europa.eu/info/priorities_en

- Implementation of new policies and transformation in cities or regional governments: Padova, Rome
- Support European Policies implementation by stakeholders: EU topic guide on Sustainable Urban Logistics Plans

This analysis has led to the following conclusions and recommendations:

- The Sustainable Development Goals are a common framework for alignment between European Union, Companies.
  - o R&I programmes are explicitly addressing Sustainable Development Goals[3] and related KPIs, KPIs may need to be developed accordingly
- There is an important correlation between most of the Policy & Company social objectives. However, translating those objectives in concrete KPIs for R&I is not straightforward as there are too many Impact Indicators and KPIs.
  - o Make a prioritization of most important Impact Indicators and KPIs to address specific policy and company objectives.
- For the market-oriented implementation cases, the assessment of the pathway towards impact clearly validates the existence of the valley of death. Therefore, although there are causal links between the research and the impact, most of the conditions to achieve that impact were more dependent on addressing other critical aspects such as regulations, market, social, commercial and industrialization readiness of the solution.
  - o Define different readiness levels for R&I results to be realized as actual impacts beyond TRL.

The proposed recommendations above will be further detailed during BOOSTLOG lifespan, providing a detailed pathway linking EU policies, company objectives and proposed sets of KPIs as part of the final deliverable report D3.5.

---

[3] https://sdgs.un.org/es/goals

1 Introduction

1.1 BOOSTLOG project

BOOSTLOG vision is transforming European freight transport and logistics R&I ecosystem to perform optimally boosting impact generation out of R&I investment contributing to i) EU policy objectives towards climate neutrality, pollution, congestion and noise reduction, free movement of goods, internal security, digital transformation of logistics chains and data sharing logistics ecosystems and ii) companies' sustainability and competitiveness generating value for society.

BOOSTLOG focusses on 4 main areas of action:

i)   Increase visibility and support valorisation of R&I project Results, Outcomes and Implementation Cases in the freight transport and logistics field:

   a. Maps and asses around 160 EU-funded R&D since FP5 in different freight transport and logistics domains[4], identifies and include main results, outcomes and implementation cases from projects in ALICE Knowledge Platform[5],

   b. Develops comprehensive and industry actionable reports (logistics cloud reports) starting with: a) logistics coordination & collaboration* b) urban logistics*, c) logistics nodes*, d) freight and logistics data sharing e) multimodal freight, corridors & transport networks f) modularization and transhipment to share progress made and highlight the impact achieved through R&I projects.

ii) Overcome barriers for R&D deployment, identify and define valorisation strategies and guidelines to speed up the technological and organisational innovation uptake, including the creation of the Innovation Marketplace within ALICE knowledge platform, examine which areas of research have achieved higher impact and issue recommendations to increase impact of R&I public funding,

iii) Identify and define high potential & priority R&I gaps to make efficient uses of R&I investments and provides recommendations to funding organizations (e.g. European Commission) and

iv) Boost impact of the project outputs towards end users of the freight transport and logistics system, establishing collaboration frameworks for the exchange of best practices in freight transport and logistics R&I at regional, national, European level, engaging with relevant stakeholders in the innovation process.

1.2 Scope of this deliverable

In the framework of BOOSTLOG area of action ii) addressed in Work Package 3, "*Accelerating public funded R&I uptake",* task 3.3 focusses on two main activities:

i)   Analyse and relate Government (Policy and R&I), Companies objectives and sectoral-specific KPIs so clearer links can be established across stakeholders' groups and

---

[4] All BOOSTLOG deliverables once submitted are available at the BOOSTLOG webpage: https://www.etp-logistics.eu/boostlog/
[5] https://www.etp-logistics.eu/knowledge-platform/
* Already released

ii) Analyse R&I impacts per cloud report and identify key actions, characteristics and framework conditions (and topic description) that have facilitated reaching impact from R&I investment.

The present deliverable (D3.2) shows the first report stemming from Task 3.3. It includes:

i)   The main EU policy objectives relevant for freight transport and logistics (i.e. BOOSTLOG scope).

ii) The main company objectives and specific sectoral KPIs in regards of freight transport and logistics.

iii) Reports on the two first Clouds released in BOOSTLOG, the Coordination and Collaboration Cloud (D2.2)[6] and the Urban Logistics Cloud (D2.4)[7] including:

   a.   The expected impacts (and associated KPIs) from R&I projects assessed.

   b.   The existing links and relations of EU Policy, R&I expected impacts (KPIs) and sectoral companies' objectives and clear indication on how and to what extent the KPIs support reaching the companies and policy objectives.

   c.   An initial assessment of the alignment or misalignment among EU Policy Objectives, R&I objectives (KPIs) and sectoral companies' objectives.

   d.   The state of the art and market practice before the public R&D investments took place and an assessment of how the public funds contributed to generate impact out of project R&I results further developing into Outcomes and Implementation Cases. Concretely, it includes i) further development of the TRL level beyond the funding period, ii) the level of deployment at company level and the estimated size of the operation for that company based on available benchmarks and iii) the phase of deployment of the new product and services as well as the reached or targeted market. Additionally, other impacts generated such as contribution to policies, education programmes, etc. are defined and assessed.

   e.   Stakeholder specific recommendations to boost alignment areas and address misalignments.

The report identifies the framework conditions that supported that impact generation. A deeper analysis on the characteristics of the framework program and the topic description has been performed in one of the clouds to understand the conditions that have facilitated reaching impact. This analysis will be replicated for the other clouds in the upcoming version of this deliverable.

Indeed, a second report (D3.5) will complete the information in this deliverable including the overall analysis of all BOOSTLOG Cloud Reports and will assess in which Logistics Cloud the EU funding had the highest impact.

The main company objectives and specific KPIs included in this report will be further discussed, complemented and validated by companies through surveys and interviews. It will provide

---

[6]   D2.2   Cloud   report   –   Coordination   and   Collaboration.   https://www.etp-logistics.eu/wp-content/uploads/2021/12/BOOSTLOG_D2.2-Cloud-report-Coordination-and-Collaboration_final.pdf

[7] D2.4 Cloud report – Urban Logistics. https://www.etp-logistics.eu/wp-content/uploads/2022/03/BOOSTLOG_D2.4-Cloud-report-Urban-Logistics_final.pdf

recommendations for freight transport and logistics sector specific KPIs to measure impact of EU-R&I funding and the links with European policy objectives and Horizon Europe programme.

Additionally, it will include the European Commission DGs, Directorates and Units that have (or may have) a link to the freight transport and logistics sector, the Policy Objectives or to the Research Programme pursuing/contributing to that objective. Companies' sectorial objectives will also be mapped to identify alignments and miss matches between Companies and European Commission objectives.

1.3   Why this deliverable: aim, challenges and contribution

Research and Innovation are crucial to address Europe's economic and societal challenges and are key drivers of productivity and economic growth as demonstrated by ample empirical evidence.[8] R&I contribute to reaping the new growth opportunities generated from knowledge, technological breakthroughs, process and product innovations, and new business models in a fast-changing world that support economic performance and help tackling societal challenges.

This deliverable aims to contribute to identify and assess impacts out of R&I investments and identify gaps and misalignments between policy and company objectives and R&I programmes in support of those.

Achieving impact generation out of research is complex because of three main reasons:

i) *The valley of death* i.e. the time delay between research activities and the actual implementation in practice. It is difficult to translate scientific knowledge base into commercial goods and services and has been highlighted in many studies as a major problem of EU innovation ecosystem[9]. **In this deliverable we share and assess the path towards impact from 11 Implementation Cases and how they managed to successfully overcome the valley of death.**

ii) *Unclear and non-existing KPIs to measure actual R&I impact*. The Lamy Report[10] calls for extensive communication of impacts of research by beneficiaries which is indeed an important part of the dissemination and communication efforts of projects. However, capturing the whole breadth of R&I benefits is recognized as a complex operation.[13] In many cases, impact measurement is focussed exclusively on the ability of the private and public sectors to translate investment in R&I into patent applications[11]. Available indicators face indeed limitations[12] and defining them is complex. Additionally, measurement linked to the intangible and the changing nature of innovation pose significant additional challenges.[13]. For this reason, ALICE embraced a more comprehensive methodology[13] beyond KPIs to assess R&I funded projects impact. **Concrete impacts out of R&I results are shared and quantified.** Although projects define KPIs to measure impact, these impacts are limited

---

[8]   European Commission DG Research. (2017). *The Economic Rationale for Public R&I Funding and its Impact.*

[9] KETs: time to act. European Commission High Level Expert Group on KETs. (2015)

[10]   Lamy High Level Group Report (2017). *LAB-FAB-APP, Investing in the European future we want*,

[11]   Conte (2014). Efficiency of R&D Spending at national and regional level, Technical Report, Joint Research Centre, European Commission

[12]   Research and innovation as sources of renewed growth. *European Commission Communication (2014) 339 final.*

[13]   ALICE Research Roadmaps Implementation Plan and Monitoring follow up. *(2018) Deliverable D3.3 SETRIS H2020 project. Grant agreement ID: 653739*

to the tests, pilots and living labs conditions in those projects. As such, these KPIs demonstrate a potential impact under very concrete conditions and with important assumptions so these benefits are not directly translated into actual impact at the end of the project as in most cases those pilots, tests and living labs are discontinued when the funding ends (i.e. entering in the *valley of death*) or the transferability is limited.

iii) _Lack of alignment between stakeholders' objectives._ Non-matching objectives between programmes and stakeholders i.e. linking broad policy objectives, R&I programmes objectives and overall logistics and broader transport system sectorial objectives makes it difficult to create a holistic framework for EU projects assessment that gathers roles, interests and associated KPIs for all stakeholders in a consistent way**.** ***An initial assessment of the alignment or misalignment among EU Policy Objectives, R&I objectives (KPIs) and sectoral companies' objectives for the cloud reports available is provided.***

The H2020 programme interim evaluation[14] identified several of these factors: regulatory obstacles, lack of standards, market fragmentation,[15] or customer acceptance of new solutions as important challenges for market uptake. ***Change can be accelerated through the alignment of EU Policy objectives, company objectives and associated R&I policies in support of those objectives***.

> This report contributes to provide insights on the alignments and misalignments of EU Policy objectives, company objectives and associated R&I policies as a starting point and a framework to: i) further complete with the additional cloud reports to be produced, and ii) be discussed with relevant stakeholders and improved accordingly.

---

[14]   European Commission (2017) *Executive Summary of the Interim Evaluation of H2020*. (SWD 220 & 221)

[15]   European Commission DG R&I.. (2018). *Transitions on the Horizon: Perspectives for the European Union's future research and innovation policies*. *978-92-79-81266-8 - KI-02-18-425-EN-N*

2   Methodology, information gathering and analysis

Impacts and policy objectives contribution and recommendations proposed in this report are based on in-house knowledge, analysis of past projects, outcomes and implementation cases, various interviews with practitioners and discussions from various events organised. The authors and many stakeholders engaged (e.g. expert interviewed) have extensive experiences with EU funded projects and have actively participated in all phases of R&I projects.

2.1   Inputs collected from Cloud Report

Several factors that have influenced the implementations of R&I projects have been gathered and reported, thus forming inputs to this report.

For Logistics Coordination and Collaboration, 19 projects from FP5, FP7 and HORIZON2020 have been selected for analysis as shown in *Figure 1*:

Figure 1. Past projects on Logistics Coordination and Collaboration.

For Urban logistics, 21 projects from FP5, FP6, FP7 and Horizon 2020 have been analysed (*Figure 2*):

Figure 2. Past projects on Urban Logistics.

11

Note that some projects may be included in both cloud reports as they cover both sub topics.

11 Implementation cases have been identified: MIXMOVE, TRI=VIZOR, SMARTBOX, CRC SERVICES, "Rome Logistics Living Lab", "Declaration of Intent: Call for zero emission freight vehicles", "SEUL-Smart Electric Urban Logistics", Padova Cityporto, VISEVA-W, "Emilia Romagna Permit Portal" and "Sustainable urban logistics planning topic guide".

Authors of each cloud report have conducted semi-structured interviews to practitioners who have participated in those R&I projects identified and the implementation cases owners have been consulted to check their cases. Many practitioners have made significant efforts to advance market uptake of outcomes of their projects, thus delivering concrete impacts on the logistics sector. For the cloud report on logistics Coordination and Collaboration (D2.2), 9 interviews were conducted; for the cloud report on Urban Logistics (D2.4), 8 interviews were conducted. Additionally, all implementation cases were validated by the owners.

2.2 Inputs collected from BOOSTLOG Events

The BOOSTLOG consortium has organised four events where information on projects and implementation cases has been collected:

- BOOSTLOG launch event[16], 24th March 2021
- BOOSTLOG WP4 Workshop on Identifying R&I priorities in logistics[17], 26th October 2021
- BOOSTLOG Coordination and Collaboration Cloud Report Launch Event[18], 24th November 2021
- BOOSTLOG Urban Logistics Cloud Report Launch Event[19], 28th April 2022

Each of the events has been attended by various stakeholders. In BOOSTLOG, four types of stakeholders are considered:

- Company;
- R&I;
- Government;
- Others (including civil society and associations).

Detailed information about stakeholder engagement for the BOOSTLOG project can be found in D5.1 Plan for Stakeholder engagement, communication and dissemination.

Percentages of each type of stakeholders in the three BOOSTLOG events are shown in *Table 1*:

---

[16] Detailed information about the event can be found: https://www.etp-logistics.eu/boostlog-launch-event-boosting-the-impact-of-freight-transport-and-logistics-eu-funded-research-supporting-competitiveness-and-addressing-the-climate-challenge/

[17] Detailed information about the event can be found: https://www.etp-logistics.eu/online-workshop-on-identifying-ri-priorities-in-logistics-1000-1200-26th-oct-2021/

[18] Detailed information about the event can be found: https://www.etp-logistics.eu/first-alice-logistics-innovation-award-launch-of-the-cloud-report-on-coordination-and-collaboration/

[19] Detailed information about the event can be found: https://www.etp-logistics.eu/alice-logistics-innovation-award-on-urban-logistics-announced/

Table 1. Percentages of all types of stakeholders in BOOSTLOG events.

Event	Participants	Company (%)	R&I (%)	Government (%)	Others (%)
BOOSTLOG Launch Event	130	55%	20%	11%	14%
Identifying R&I priorities in logistics	108	45%	31%	8%	16%
Coordination and Collaboration Cloud report launch event	56	61%	9%	10%	20%
Urban Logistics Cloud report launch event	56	45%	16%	9%	30%

2.3 Expected impacts and policy objectives of EU funded R&I projects analysis

The expected impacts and policy objectives of EU funded R&I projects have been identified in the mapping delivered in D2.1 as project attributes. The list of policy objectives identified for the EU funded R&I projects is:

- Digital transformation of logistics chains
- Climate neutrality
- Pollution
- Data sharing logistics ecosystems
- Free movement of goods
- Noise
- Internal security
- Congestion

A detail of these policy objectives is included in chapter 3.

2.4 Impact of the Outcomes and Implementation Cases

Different parameters have been used to analyse the impact of the most relevant outcomes from each cloud (identified as Implementation Cases):

i) Further development of the TRL level beyond the funding period.
   The current TRL level has been identified for the solutions proposed in the Implementation Cases according to the EC[20]. Technology readiness levels (TRL). Where a topic description refers to a TRL, the following definitions apply:
   - TRL 1 – basic principles observed
   - TRL 2 – technology concept formulated
   - TRL 3 – experimental proof of concept
   - TRL 4 – technology validated in lab
   - TRL 5 – technology validated in relevant environment (industrially relevant environment in the case of key enabling technologies)

---

[20] Extract from Part 19 - Commission Decision C(2014)4995. G.

- TRL 6 – technology demonstrated in relevant environment (industrially relevant environment in the case of key enabling technologies)
- TRL 7 – system prototype demonstration in operational environment
- TRL 8 – system complete and qualified
- TRL 9 – actual system proven in operational environment (competitive manufacturing in the case of key enabling technologies; or in space)

ii) The phase of deployment of the new product and services as well as the reached or targeted market
- Level of penetration and market acceptance
  - *Market penetration* is a measure of how much a product or service is being used by customers compared to the total estimated market for that product or service.
  - *Market acceptance* is the level of satisfaction with a *product* or service in a target *market* that merits continued or increased supply of the *product* or service.
- TAM-SAM-SOM analysis and business plans (when available). Below the general TAM-SAM-SOM methodology is described. Due to the inhomogeneous data available for the different implementation cases a qualitative approach of the proposed market assessment was performed.
  - Total Addressable Market (TAM). TAM looks at the entire potential value of the overall market (think, the total value for a product sale in the target area in a given year). The market size estimation is a huge number, and probably unattainable by one company. TAM can provide a framework for a market's potential and stability. To calculate TAM, add up all product sales across the market.
  - Serviceable Addressable Market (SAM). SAM refers to the specific potential audience for a product or offering (the total value of the specific product produced by a company for the target audience). This is the maximum market value of your company based on this target market. To calculate SAM, add up all the relevant product sales across the market.
  - Serviceable Obtainable Market (SOM). SOM is a representation of the proportion of the SAM that a company is likely to obtain. Assuming the product of a company is not the only one available in the market (multiple manufacturers/service providers), that number will be smaller than the SAM. To calculate SOM, divide last year's revenue by last year's SAM. This is the market share. Now multiply the market share by the dollar-value SAM for this year. For launching a new product, SOM can be estimated by conducting competitive analysis and estimating the SOM based on factors such as web traffic, marketing mix, and ad spend.
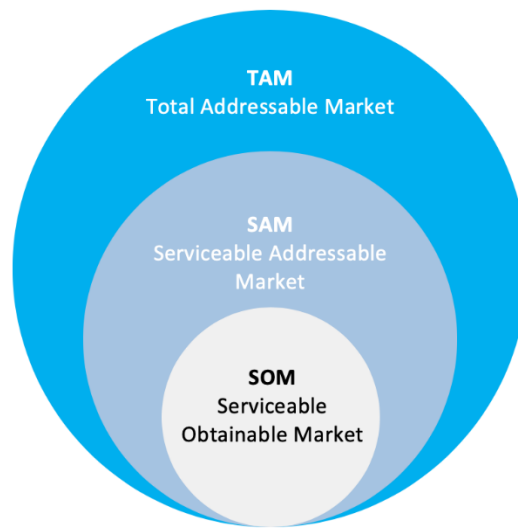
Figure 3.   TAM, SAM, SOM methodology.

On top of the company implementation cases, other impacts generated such as contribution to policies, education programmes, etc. are defined and assessed. The parameters used to analyse the impact of the most relevant outcomes in these cases identified as Implementation Cases has been:

- Operational, social and market impact: if solutions or outcomes have been concretely adopted by project partners to develop a new service or product
- Influence on policy: If solutions, measures our outcomes have been included in local SUMP/SULP or also regional or national planning documents
- Scalability and growth potential: depending mainly on the level of involvement of different kind of stakeholders, in particular private actors.

3 EU policy, companies and R&I programmes objectives and KPIs

In this chapter, the objectives at policy, company and Research and EU Innovation Programmes, and projects KPIs is reported as the starting point to:

- Identify the existing links and relations of EU Policy, R&I expected impacts (KPIs) and sectoral companies' objectives and a further analysis on how and to what extent the R&I KPIs support reaching the companies and policy objectives.
- Do an initial assessment of the alignment or misalignment among EU Policy Objectives, R&I objectives (KPIs) and sectoral companies' objectives.

Based on desk research, the Sustainable Development Goals are a common framework for alignment between European Union and companies:

- European Union priorities are aligned with the Sustainable Development Goals[21] and significant advances have been made in the European Union in the last five years[22].
- A recent publication of Global Reporting Initiative[23] analyses a sample of over 200 companies around the world that produced a GRI report in 2020. 83% of companies state that they support the Sustainable Development Goals, recognizing the value of aligning their reports with the Goals;

3.1 EU policy objectives relevant for freight transport and logistics

climate neutrality, pollution, congestion, noise, free movement of goods, internal security, digital transformation of logistics chains **and** *data sharing logistics ecosystems* **are the main EU policy areas relevant for freight transport and logistics**

The European Commission established the priorities for the period 2019-2024[24]. These priorities are also aligned with the Sustainable Development Goals[25]. Significant advances have been made in the European Union in the last five years[26]. BOOSTLOG focus on the following EU policy objectives/priorities for which integrated freight transport and logistics systems can contribute to:

The European Green Deal[27] aims to achieve **climate neutrality** by 2050. Moreover, the **European Climate Law**[28] writes into law the goal set out in the European Green Deal. The European Commission adopted a set of proposals[29] to make the EU's climate, energy, transport and taxation policies fit for

---

[21] https://ec.europa.eu/info/strategy/international-strategies/sustainable-development-goals_en

[22] Sustainable development in the European Union — Monitoring report on progress towards the SDGs in an EU context — 2022 edition https://ec.europa.eu/commission/presscorner/detail/en/IP_22_3212

[23] GRI 2022. https://www.globalreporting.org/about-gri/news-center/most-companies-align-with-sdgs-but-more-to-do-on-assessing-progress/

[24] European Commission Priorities 2019-2024. *https://ec.europa.eu/info/priorities_en*

[25] https://ec.europa.eu/info/strategy/international-strategies/sustainable-development-goals_en

[26] Sustainable development in the European Union — Monitoring report on progress towards the SDGs in an EU context — 2022 edition https://ec.europa.eu/commission/presscorner/detail/en/IP_22_3212

[27] The European Green Deal. Brussels, COM (2019) 640 final

[28] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32021R1119

[29] https://ec.europa.eu/commission/presscorner/detail/en/IP_21_3541

reducing net greenhouse gas emissions by at least 55% by 2030, compared to 1990 levels[30]. The most relevant for freight and logistics are:

- 50% reduction of **emissions from vans** by 2030 and zero emissions at 2035[31].
- **Revision of the EU Emission Trading System**[32] to lower the overall emission cap even further and increase its annual rate of reduction, to phase out free emission allowances for aviation and align with the global Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) and to include shipping emissions for the first time in the EU ETS. To address the lack of emissions reductions in road transport, a separate new emissions trading system is set up for fuel distribution for road transport.
- Revised **Alternative Fuels Infrastructure Regulation** will require Member States to expand charging capacity[33]

Additionally, the Green Deal includes as an objective that *Transport should become drastically less polluting, especially in cities* and advocates for a combination of measures to address **pollution** and **congestion** issues. Based on latest available data, the transport sector is the largest contributor to nitrogen oxide emissions, and a significant contributor to particulate matter emissions[34]. Urban freight accounts for a significant part of ambient **noise** in cities and impacts air quality as it generates 30 to 50% of transport-related pollutants such as particulate matters (PM) or Nitrogen Oxide (NOx)[4]. Growing demand for e-commerce delivery will result in 36% more delivery vehicles in inner cities by 2030, leading to a rise in both emissions and traffic congestion without effective intervention. Without effective intervention, urban last-mile delivery emissions and traffic congestion are on track to increase by over 30% in the top 100 cities globally[35].

Economy that Works for People[36] One of the main pillars within this priority is the single market[37] aiming at **free movement of goods** among others. Single market and a truly integrated freight transport and logistics systems are the two faces of the same coin. Still, a lot of burden is created due to cross-border issues in rail freight transport, or e-commerce, but also in case of emergencies such as the COVID-19 outbreak that highlighted the barriers still in place but also the need to be united as included in the *COVID-19 Guidelines for border management measures to protect health and ensure the availability of goods and essential services*[38] for the efficient, free movement of goods and services. This area is very sensitive from a political point of view and therefore R&I may have a limited impact. Freight transport and logistics actors are building innovative solutions to reduce this burden not only

[30] https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal/delivering-european-green-deal_en

[31] https://www.europarl.europa.eu/news/en/press-room/20220603IPR32129/fit-for-55-meps-back-objective-of-zero-emissions-for-cars-and-vans-in-2035

[32] https://ec.europa.eu/info/files/revision-eu-emission-trading-system_en

[33] https://oeil.secure.europarl.europa.eu/oeil/popups/summary.do?id=1670400&t=d&l=en

[34] EEA (2017). *Air Quality in Europe – 2017 Report*. European Environment Agency.

[35] World Economic Forum (2020). The Future of the Last-Mile Ecosystem. Transition Roadmaps for Public- and Private-Sector Players

[36] *European Commission Priority: An economy that works for people*. https://ec.europa.eu/info/strategy/priorities-2019-2024/economy-works-people_en

[37] *European Commission Single Market Strategy.* https://ec.europa.eu/info/strategy/priorities-2019-2024/economy-works-people/internal-market_en

[38] COVID-19 Guidelines for border management measures to protect health and ensure the availability of goods and essential services. COM (2020) 1753 final.

addressing the internal market but also in connecting to global markets and supply chains and very recently to UK due to BREXIT.

Promoting our European way of life[39] withing this policy area, freight transport and logistics contribute to the **internal security** objective. It is the European Commission ambition to *take the Customs Union to the next level, equipping it with a stronger framework that will allow us to better protect our citizens and our single market. It will propose a bold package for an integrated European approach to reinforce customs risk management and support effective controls by the Member States*[40]. Global trade is a key element and international freight, and logistics chains need to deal with international borders efficiently.

A Europe fit for the digital age[41] The recent European Commission Communication acknowledges the future **digital transformation of logistic chains**[42]. Digital and other technologies such as artificial intelligence, autonomous transport, electrification, Internet of Things, blockchain, automation and robotic systems, further digitalisation, new transport modes, 5G and 6G, supercomputing, will play an important role as Key Enabling Technologies (KETs) for more sustainable and efficient freight transport and logistics. These technologies combined with a proper data strategy[43] will create the digital capability to build up a truly integrated transport system for sustainable and efficient logistics.

End of 2020, the European Commission presented the **Sustainable and Smart Mobility Strategy[44]** together with an Action Plan of 82 initiatives to get transport ready for the digital transformation, climate change mitigation and adaptation. This includes actions in all transport sectors as well as for cross-modal **data sharing logistics ecosystems** building on the developments of the Digital Transport and Logistics Forum[45]. More generally, digitalisation is already reshaping the transport sector, leading to strongly improved logistics across transport modes[46].

Most relevant objectives of the Sustainable and Smart Mobility Strategy are, by 2030: 100 European cities will be climate neutral and by 2050: rail freight traffic will double. Additionally, creating zero-emission airports and ports and making connected and automated multimodal mobility a reality by freight to seamlessly switch between transport modes.

Relevant policy initiatives not mentioned earlier are:

- Revision of the Weights and Dimensions Directive (2022)
- Revision of the Urban Mobility Package of 2013[47] (2021)

---

[39]European Commission Priority: Promoting our European way of life https://ec.europa.eu/info/strategy/priorities-2019-2024/promoting-our-european-way-life_en

[40] A Union that strives for more. My agenda for Europe By candidate for President of the European Commission Ursula von der Leyen (2019).

[41] European Commission Priority: A Europe fit for the digital age. *https://ec.europa.eu/info/strategy/priorities-2019-2024/europe-fit-digital-age_en*

[42] Shaping Europe's digital future, COM (2020) 67 final.

[43] A European strategy for data, COM (2020) 66 final.

[44] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52020DC0789

[45] Digital Transport and Logistics Forum, DTLF (*www.dtlf.eu*). Commission Expert Group (E03280).

[46] Proposal for a Regulation on electronic freight transport information (COM/2018/279 final) and Proposal for a Regulation establishing a European Maritime Single Window environment and repealing Directive 2010/65/EU (COM/2018/278 final).

[47] https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12916-Sustainable-transport-new-urban-mobility-framework_en

- Review of the regulatory framework for intermodal transport, including the Combined Transport Directive (2022)
- Establish EU framework for harmonised measurement of transport and logistics emissions (2022)
- Propose rules on a trusted environment for corridor data exchange to support collaborative Logistics (2022)
- Revision of the Regulation on the Trans-European Transport Network (TEN-T)[48] (2021)
- International freight and passenger transport – increasing the share of rail traffic (2022)

End of 2021 the European Commission launched new transport proposals targeting greater efficiency and more sustainable transport[49], particularly addressing revised guidelines for the TEN-T development and **the new EU Urban Mobility Framework**. Cities are recognized as important elements of a well-functioning TEN-T network. Among main objectives:

- To support quicker and more efficient zero-emission logistics in urban nodes, enough multimodal terminals and freight consolidation centres.
- Alternative delivery solutions, such as cargo bikes and inland waterways should also be considered and better utilised in urban logistics, with automated deliveries and drones (unmanned aircraft) being increasingly used in the future, where appropriate.
- To support regions and cities in the roll-out of effective sustainable urban mobility plans in particular addressing Sustainable Urban Logistics Plans (SULP), based on zero-emission vehicles and solutions;
- Support voluntary data sharing between all types of stakeholders to make urban freight transport more efficient, sustainable and competitive (in connection with the Digital Transport and Logistics Forum).

Moreover, the European Commission launched the **European industrial strategy**[50] to ensure that its industrial ambition takes full account of the new circumstances following the COVID-19 crisis and helps to drive the transformation to a more sustainable, digital, resilient and globally competitive economy. Although freight and logistics demonstrated the value as an industry to keep Europe running and it is one of the most important sectors accountings for around 10% GDP, industry strategy has little focus on **logistics competitiveness**.

3.2 Company objectives in freight transport and logistics

While every business might have specific objectives according to the industry they operate, the corporate objectives usually fall in these three categories:

- <u>**Economic & competition (Profit)**</u> aiming at keeping the company operating and in business, increasing productivity of people and resources, creating revenues and reducing costs to increase profits ensuring healthy finance and cash flows. Additionally, focusing on growth and/or a

---

[48] European Commission 2021. Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on Union guidelines for the development of the trans-European transport network, amending Regulation (EU) 2021/1153 and Regulation (EU) No 913/2010 and repealing Regulation (EU) 1315/2013. COM/2021/812 final

[49] https://ec.europa.eu/commission/presscorner/detail/en/ip_21_6776

[50] https://ec.europa.eu/growth/industry/strategy_en

combination of growth and selecting those business segments with bigger margins. Reaching the right customers and suppliers with excellence customer service, operations and staying ahead of competition in the marketplace the company operates are important competition objectives.

- **People** & company culture aiming at providing employees with support and matching their needs and interest achieving employee attraction and retention, building the organization ideals and values, diversity, and inclusion as well as change management.

- **Social & Planet** aiming at giving back the value to the society ensuring fair trade, protecting the environment, supporting local communities and in general supporting the Sustainable Development Goals.

Freight Transport and logistics is a basic function of companies to achieve their primary objectives. While in the past it was solely treated as an economic (cost) function and as an element for competition, lately the social dimension is becoming more and more important due to the implications of transport and logistics on climate, pollution, congestion and noise.

The essence of logistics is the flow that encompasses all the steps and processes involved in delivering the materials or goods of a company to another company or end consumers. It involves not only physical flows but also information flows and triggers financial flows when the material and goods are effectively handed to a company and the end users.

The most relevant freight transport and logistics company objectives are:

- Increasing **efficiency & productivity**
- Fulfilling **customer** requirements and ensuring product availability.
- Rapid response, **flexibility and agility**
- Fewer unexpected events, **reliability and resilience**
- Minimum **inventory**
- Reduced transportation and logistics **cost**

The effectiveness of freight transport and logistics is different for each company according to the priority objectives.

ALICE identified in its Research and Innovation Roadmaps (2014)[51] the following **indicators to achieve the company objectives** for freight transport and logistics:

Increase:
+ Load factors: weight and cube fill of vehicles
+ Volume flexibility (Time to +/- capacity)
+ % synchromodal
+ Asset utilization
+ Supply Chain Visibility
+ Reliability of transport schedules
+ Order fulfilment
+ Transport routes optimization (reducing Kms)

---

[51] https://www.etp-logistics.eu/about-alice/documents-publications/

+ Automatic data exchange

+ Cargo and logistics units integrated in the automatic data exchange

+ Upside / Downside supply chain adaptability and flexibility

Decrease:

- Empty Kilometres

- Waiting time in terminals

- Risk factor reduction

- End-to-end transportation time

- Travel distance to reach the market

- Cargo lost o theft of damage

- Lead times

Additionally, established **impact indicators of freight transport and logistics operations are**:

- Energy consumption

+ Renewable energy share

- Greenhouse gas emissions

3.3   R&I programmes objectives and KPIs

Minimise transport systems' negative impacts on climate and the environment, reduce congestion, improve accessibility and the mobility of people and freight by developing new concepts of freight transport and logistics were important and key objectives set for the Smart, Green and Integrated Transport section of Horizon 2020[52] and will continue to be in Horizon Europe[53] programme. A growing need of adaptation is also expected to deal with the COVID-19 crisis. EU and other public R&I investments are fundamental to achieve policy, economical and societal objectives.

List of expected impacts (and KPIs) identified for the EU funded R&I projects in each cloud:

- Decrease of environmental impact (CO_2 emissions/unit of transport; Local pollutants/unit of transport)
- Reduction of congestion on the road network (Number of eliminated trucks per year; Reduction of average trip time for other road vehicles; Increase in average travel speed for other road vehicles)
- Modal shift (Absolute productivity of various transport modes in ton*km; Market share in % per mode, measured in ton*km)
- Improved capacity utilisation of barge, train and truck (TEU/barge-km; TEU/train-km; TEU/barge/train/ truck-km)
- Decrease cost of transport & overall logistics (Cost/unit of transport; Fuel cost/unit of transport; % of cost decrease /TEU)
- Improved inventory management (Reduction of inventory levels at nodal and end-to-end levels; Reduction of total working capital; Reduction of product stockouts)

---

[52]   Smart, Green and Integrated Transport, H2020 Programme section
https://ec.europa.eu/programmes/horizon2020/en/h2020-section/smart-green-and-integrated-transport

[53]   https://ec.europa.eu/info/horizon-europe-next-research-and-innovation-framework-programme_en

- Increased transport reliability and responsiveness (% On Time In Full Delivery; Better customer service; % Customer Case Fill On Time)
- Increase management capacity of terminals and productivity
- Improved operations in terminals (Improved connection time at ports and terminals: Dwell time; waiting time. Improved transfer time. Increased network speed /reduced waiting times)
- On-time arrival rate (% cancelled routes)
- Improved terminal capacity utilization and efficiency (Terminal throughput; Number of movements; Slot availability; Transshipment time; Truck waiting time; Quay productivity)
- Decrease travel times (Average travel time/delivery c. Increase delivery reliability; % On Time In Full Delivery)
- Improve energy consumption (Energy consumption/unit of transport)
- Increase transport efficiency (Average load factor; Number of vehicles/total units of transport; Vehicles*km; Number of journeys; - Number of failed deliveries)
- Improve the performance of the European Transport (Hyper-connected network of logistics hubs and clusters to optimize transport in the network; Increase average door-to-door vehicle load factor; Increase intermodal transport in the network)
- Improve long distance-city distribution connectivity (% Decrease in operational handling)

4 Analysis and relation of EU policy, company objectives and R&I projects expected impacts

4.1 Contribution of the Expected Impact of R&I projects to the policy & company objectives

The following table links the expected IMPACTS (and their related KPIs) with the policy and company objectives identified in the mapping of the projects (D2.1).

From the expected IMPACTS and KPIs identified to have a direct impact on the POLICY objectives, most of the IMPACTS hit on several POLICY objectives, contributing to a greater extent to meeting them.

Table 2. Contribution of the expected impacts to the policy objectives.

EXPECTED IMPACT	KPI	POLICY OBJECTIVE	COMPANY OBJECTIVES
Decrease of environmental impact	CO_2 emissions/unit of transport; Local pollutants/unit of transport	climate neutrality pollution	climate neutrality n.a.
Reduction of congestion on the road network	Number of eliminated trucks per year; Reduction of average trip time for other road vehicles; Increase in average travel speed for other road vehicles	pollution and congestion climate neutrality	efficiency climate neutrality
Modal shift	Absolute productivity of various transport modes in ton*km; Market share in % per mode, measured in ton*km	climate neutrality	climate neutrality
Improved capacity utilisation of barge, train and truck	TEU/barge-km; TEU/train-km; TEU/barge/train/ truck-km	climate neutrality	climate neutrality efficiency
Decrease cost of transport & overall logistics	Cost/unit of transport; Fuel cost/unit of transport; % of cost decrease /TEU	competitiveness*	cost
Improved inventory management	Reduction of inventory levels at nodal and end-to-end levels; Reduction of total working capital; Reduction of product stockouts	competitiveness*	inventory
Increased transport reliability and responsiveness	% On Time In Full Delivery; Better customer service; % Customer Case Fill On Time	competitiveness*	flexibility and agility
Increase management capacity of terminals and productivity		competitiveness*	productivity
Improved operations in terminals	Improved connection time at ports and terminals: Dwell time; waiting time. Improved transfer time. Increased network speed /reduced waiting times	competitiveness*	efficiency & productivity
On-time arrival rate	% cancelled routes	competitiveness*	reliability
Improved terminal capacity utilization and efficiency	Terminal throughput; Number of movements; Slot availability; Transhipment time; Truck waiting time; Quay productivity	competitiveness*	efficiency & productivity
Decrease travel times	Average travel time/delivery; Increase delivery reliability; % On Time In Full Delivery	congestion	reliability
Improve energy consumption	Energy consumption/unit of transport	climate neutrality	climate neutrality
Increase transport efficiency	Average load factor; Number of vehicles/total units of transport; Vehicles*km; Number of journeys; Number of failed deliveries	climate neutrality pollution and congestion	climate neutrality efficiency & productivity
Improve the performance of the European Transport	Hyper connected network of logistics hubs and clusters to optimize transport in the network; Increase average door-to-door vehicle load factor; Increase intermodal transport in the network	data sharing log ecosystems digital transform of log chains free movements of goods climate neutrality competitiveness*	climate neutrality efficiency & productivity flexibility and agility reliability and resilience

Improve long distance-city distribution connectivity	% Decrease in operational handling	competitiveness*	efficiency & productivity

* New policy objective detected and not identified in the first stage of the project.

4.2   Designing call for proposals and selecting right proposals for higher impacts

The mapping of the projects performed in D2.1 includes the mapping of the policies addressed (*Table 3 and Table 4*) by the projects and the impacts expected according to the topic calls (*Annex I and Annex II*).

4.2.1   Coordination and Collaboration Cloud

The project mapping for the contribution of the projects in the Coordination and Collaboration Cloud is compiled below.

Table 3. Mapping of the policies addressed by the projects in the Coordination and Collaboration Cloud.

POLICY OBJECTIVE / PROJECT

	MOSCA	CITYLAB	NEXTRUST	NOVELOG	SUCCESS	U-TURN	MAIN-E	PRODCHAIN	EURIDICE	KOMODA	SECURE SCM	E-FREIGHT	CO3	ICARGO	MODULUSHCA	CLUSTERS 2.0	COG-LO	ICONET	LOGISTAR
digital transformation of log chains											X	X		X		X	X	X	X
climate neutrality		X	X	X	X	X								X	X				
pollution		X	X												X				
data sharing logistics ecosystems	X		X						X	X	X	X	X	X		X	X	X	X
free movement of goods																			
noise																			
internal security																			
congestion			X																

The mapping of the projects addressing the policies objectives reveals a greater contribution to *data sharing logistics ecosystems* (with 11 projects), *digital transformation of logistics chains* and *climate neutrality* (with 7 projects each), *pollution* (with 3 projects), and *congestion* (with 1 project). The rest of the policies have not been addressed by the projects in the Coordination and Collaboration Cloud (*Figure 4*).
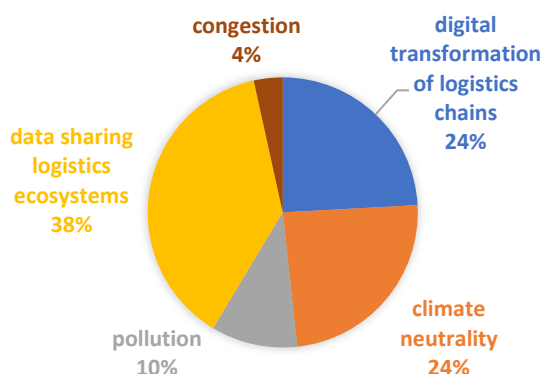
Figure 4. Policies addressed by the projects in the Coordination and Collaboration Cloud.

4.2.2 Urban Logistics Cloud

The project mapping for the contribution of the projects in the Urban Logistics Cloud is compiled in *Table 4*.

Table 4. Mapping of the policies addressed by the projects in the Urban Logistics Cloud.

POLICY OBJECTIVE / PROJECT

	MOSCA	CITY MOVE	CITYLOG	DELIVER	CITY FREIGHT	CITYLAB	CIVITAS ECCENTRIC	NEXTRUST	NOVELOG	FIDEUS	FREVUE	FURBOT	INSTANT MOBILITY	OPTICITIES	SMARTFUSION	STRAIGHTSOL	SUCCESS	U-TURN	V-FEATHER	VitalNodes	EDRUL
digital transformation of log chains							X	X							X	X				X	
climate neutrality	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
pollution	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
data sharing logistics ecosystems	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X
free movement of goods								X													
noise	X		X	X	X	X		X	X	X		X	X	X		X	X	X	X		X
internal security																					
congestion	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

The mapping of the projects addressing in *Figure 5* the policies' objectives reveals a greater contribution to Climate Neutrality, Pollution and Congestion (all projects address these objectives). Data sharing, Noise is highly addressed as well (between 15 to 16 projects), while digital transformation of logistics chains and free movement of goods are poorly addressed (5, 1 and 0 projects respectively).

POLICIES ADDRESSED BY THE PROJECTS IN THE URBAN LOGISTICS CLOUD
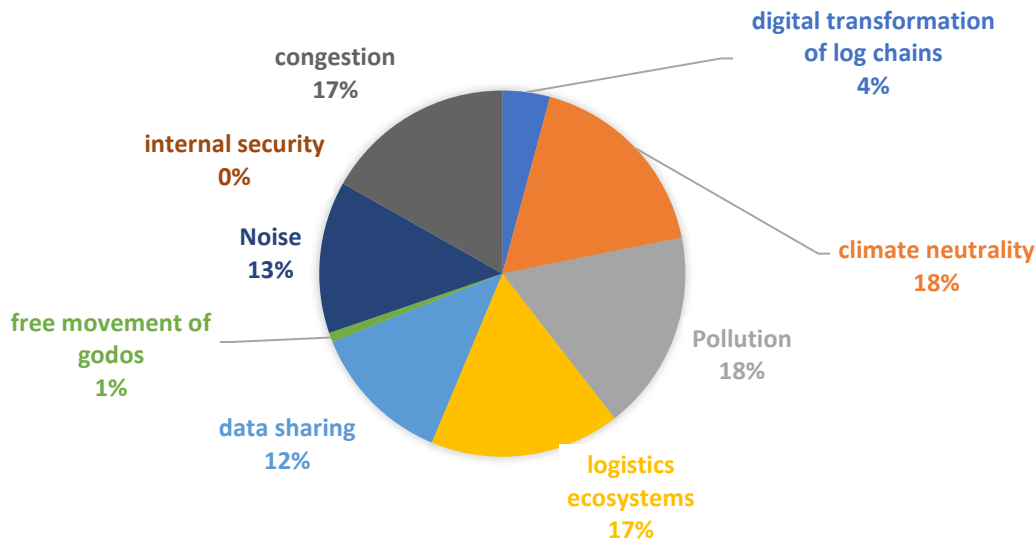
Figure 5. Policies addressed by the projects in the Urban Logistics Cloud.

4.3 Analysis of the Expected Impacts and how these KPIs create positive impact regarding policy objectives

4.3.1 Coordination and Collaboration Cloud

A set of expected impacts from the R&I projects have been validated by experts in the BOOSTLOG validation workshop for the Coordination and Collaboration Cloud, because of improved coordination and collaboration quality.

- Decrease of environmental impact
- Reduction of congestion on the road network
- Modal shift
- Decrease cost of transport & overall logistics
- Increased transport reliability and responsiveness
- Decrease travel times
- Increase transport efficiency

Table 5 presents the relation of the projects addressing the different expected impacts validated by the experts.

Table 5. Expected impacts KPIs and projects addressing them in the Coordination and Collaboration Cloud.

Expected Impact	KPIs	Projects
Decrease of environmental impact	CO2 emissions	CITYLAB, COG-LO, CLUSTERS 2.0, CO3, iCARGO, ICONET, LOGISTAR, MODULUSHCA, NEXTRUST, NOVELOG, SUCCESS, U-TURN
	Local pollutants	CITYLAB, NEXTRUST, NOVELOG, SUCCESS, U-TURN
Increase transport and logistics efficiency	Increase load factors (urban, non urban, **both**)	CITYLAB, *COG-LO, CLUSTERS 2.0, CO3*, iCARGO, **ICONET**, *LOGISTAR*, **NEXTRUST**, NOVELOG, MODULUSHCA
	Reduce empty trips/kms	NEXTRUST, MODULUSHCA, iCARGO, CO3
	reduce empty storage/space	ICONET
	shorter delivery routes	CITYLAB, NOVELOG, SUCCESS, U-TURN
	Reduce failed deliveries	CITYLAB, U-TURN
Reduction of congestion	Reduced vehicles movements /Nr. of vehicles	CITYLAB, COG-LO, CLUSTERS 2.0, ICONET, LOGISTAR, NEXTRUST, NOVELOG, SUCCESS, U-TURN, iCARGO
Achieving and increase in modal shift to rail freight/waterways transport	Create new intermodal connections	CO3, CLUSTERS 2.0, ICONET, NEXTRUST, LOGISTAR
Decrease of overall transportation and logistics cost	Cost/unit of transport	CITYLAB, NOVELOG, SUCCESS, U-TURN, iCARGO
Increased reliability of the Supply Chain	On time delivery	COG-LO, LOGISTAR
Decreased Lead Times	Reduced Travel time	COG-LO, LOGISTAR

From the expected impacts from projects validated by the experts in the workshop (i.e. for which projects demonstrated potential impact), we can identify the projects that have addressed the expected impacts identified in D2.1. Also, the project contributing impacts not directly indicated in the topic.

In *Annex I*, the expected impacts (from the topic's definition) are identified (from D2.1). In blue, the expected impacts validated by experts. In green the impacts validated by the experts not explicitly addressed by the topic. In orange, expected impacts specified in the topics but not achieved by the projects.

Most of the expected impacts validated by experts were addressed (*Figure 6*). It can be observed that the expected impacts validated by the experts as 100% (all the projects contributed to the expected impacts from the topic) are related. The decrease in environmental impact can be achieved by increasing transport efficiency and the reduction of congestion. As well as an increase in transport reliability can be achieved by a decrease in travel times. The *decrease in the cost of transport and overall logistics* were only validated in 50% of the projects (4 of 8 projects achieved the expected impact). For the *modal shift* impact, only 1 project was validated (among 3 projects with this expected impact).
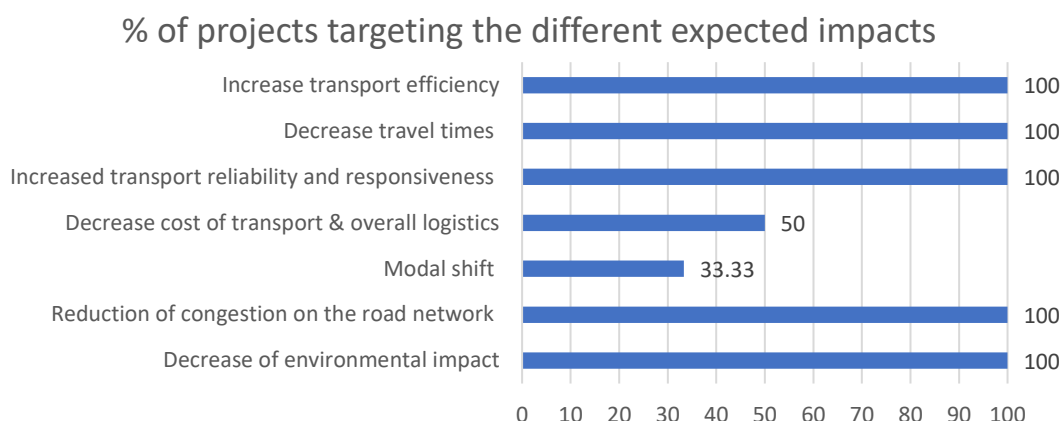
% of projects targeting the different expected impacts

Impact	Value
Increase transport efficiency	100
Decrease travel times	100
Increased transport reliability and responsiveness	100
Decrease cost of transport & overall logistics	50
Modal shift	33.33
Reduction of congestion on the road network	100
Decrease of environmental impact	100

Figure 6. % of projects targeting the expected impacts from the Collaboration and Coordination Cloud validated by experts.

Another interesting finding is the fact that some projects achieved impacts not identified as expected for 4 of the topics validated (to see *Figure 7*):

- *Reduction of congestion on the road network*, 6 projects achieved this expected impact not included in the topic definition
- *Modal shift*, 4 projects achieved this expected impact not included in the topic definition
- *Increase transport efficiency*, 4 projects achieved this expected impact not included in the topic definition
- *Decrease cost of transport & overall logistics*, 1 project achieved this expected impact not included in the topic definition

Projects expected impacts beyond call description

Impact	Achieved but not specified in the call	Not achieved
Increase transport efficiency	4	
Decrease travel times		
Increased transport reliability and responsiveness		
Decrease cost of transport & overall logistics	1	4
Modal shift	4	2
Reduction of congestion on the road network	6	
Decrease of environmental impact		

■ Achieved but not specified in the call   ■ Not achieved

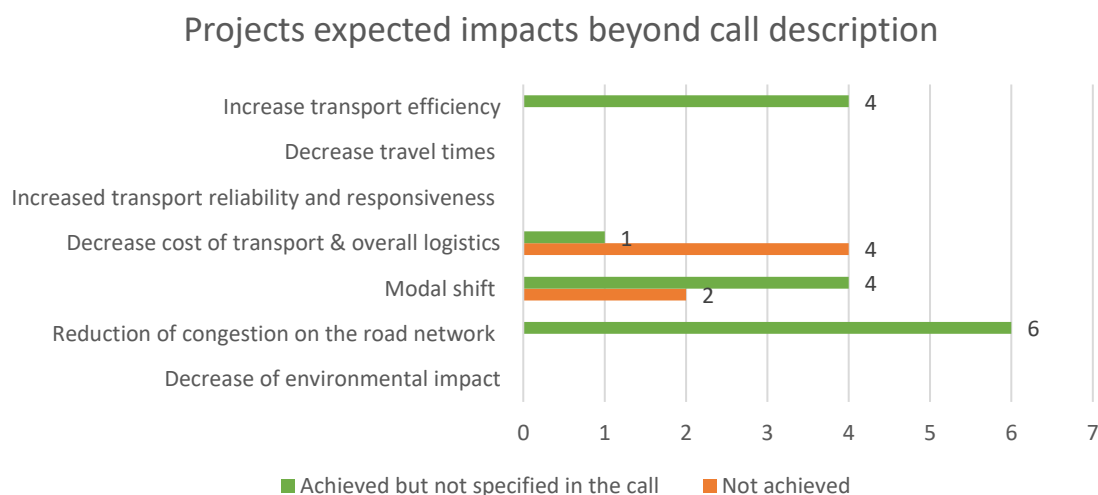**Figure 7.** Projects impacts beyond expected for the Collaboration and Coordination Cloud.

With the analysis performed in *Annex I* (expected impacts from the calls vs the impacts validated by the experts) we can further elaborate:

- Synergic impacts (topics addressing one impact which involves another one not specified), clearly observed from the impacts achieved by some projects but not identified as expected impacts in the topic.

- o A *decrease of environmental impact* usually produced a *reduction of congestion on the road network* even though it was not identified as an expected impact in the topic
  - o A *decrease of environmental impact* usually produced an *increase in transport efficiency* even though it was not identified as an expected impact in the topic
  - o A logical correlation was also found between *increased transport reliability and responsiveness*, and *decreased travel times.*
- Most achieved and less achieved impacts (easier/difficult to achieve in a project, requirements, conditions to success).
- Having a deeper look at the project' expected impacts and the validation performed by the experts, we can also observe that some projects were not achieving the expected impacts in 2 topics: *modal shift* and *decrease of cost transport and overall logistics*. Therefore, the most difficult expected impacts to achieve.

4.3.2 Urban Logistics Cloud

The Urban Logistics Cloud didn't conduct a workshop during its preparation to validate the expected impacts (the impacts specified in the topics of the projects). Nevertheless, as there were many projects in common with the Coordination and Collaboration Cloud (already validated) and the team had many exchanges with the project experts and the Implementation Cases owners to gain a deeply understanding of the projects. Therefore, in *Table 6* there is a compilation of the expected impact from the R&I projects.

Table 6 compiles the expected impacts and KPIs as part of the topics calls descriptions as well as other expected impacts from the projects according to the interviews with the experts and the implementation cases owners. It also includes the projects contributing to those expected impacts and KPIs

Table 6. Expected Impacts KPIs and projects addressing them.

Expected Impact	KPIs	Projects
Decrease of environmental impact	CO2 emissions	CITYLAB, NEXTRUST, NOVELOG, SUCCESS, U-TURN, MOSCA, CITY MOVE, DELIVER, CIVITAS ECCENTRIC, FREVUE, FURBOT, OPTICITIES
	Local pollutants	CITYLAB, NEXTRUST, NOVELOG, SUCCESS, U-TURN, MOSCA, CITY MOVE, DELIVER, CITY FREIGHT, FREVUE, FIDEUS, FURBOT, SMARTFUSION, STRAIGHTSOL, V-FEATHER, VITALNODES
Increase transport and logistics efficiency	Increase load factors	CITYLAB, NEXTRUST, NOVELOG, SUCCESS, CITYLOG, DELIVER, FIDEUS, FURBOT, STRAIGHTSOL, V-FEATHER
	Reduce empty trips/kms	NEXTRUST, FURBOT, eDRULS
	shorter delivery routes	CITYLAB, NOVELOG, SUCCESS, U-TURN, MOSCA, FURBOT, INSTANT MOBILITY, OPTICITIES
	Reduce failed deliveries	CITYLAB, U-TURN, CITYLOG, CITY FREIGHT, FIDEUS, INSTANT MOBILITY, eDRULS
Reduction of congestion on the road network	Reduced vehicles movements /Nr. of vehicles	CITYLAB, NEXTRUST, NOVELOG, SUCCESS, U-TURN, MOSCA, CITYLOG. CITY FREIGHT, FREVUE, FIDEUS, OPTICITIES, VITALNODES
	Reduction of average trip time	CITYLAB, MOSCA, FURBOT, OPTICITIES, eDRULS
	Increase in average travel speed	CITYLAB, DELIVER
	Create new intermodal connections	NEXTRUST

Achieving and increase in modal shift to rail freight/waterways transport	Absolute productivity of various transport modes in ton*km	n.a.
	Market share in % per mode, measured in ton*km	n.a.
Decrease of overall transportation and logistics cost	Cost/unit of transport	CITYLAB, NOVELOG, SUCCESS, U-TURN, NEXTRUST, CITY MOVE, FREVUE, FURBOT, STRAIGHTSOL
Increased transport reliability and responsiveness	On time delivery	CITYLAB, MOSCA, CITYLOG, INSTANT MOBILITY
	Better customer service	CITYLAB, NEXTRUST, NOVELOG, MOSCA, CITY MOVE, CITYLOG, DELIVER, CIVITAS ECCENTRIC, FREVUE, FURBOT, INSTANT MOBILITY, OPTICITIES, SMARTFUSION, STRAIGHTSOL, EDRURBAN LOGISTICS
Decreased Travel Times	Reduced Travel time	CITYLAB, NEXTRUST, SUCCESS, MOSCA, CITY FREIGHT, CIVITAS ECCENTRIC, FURBOT, INSTANT MOBILITY, STRAIGHTSOL, V-FEATHER
Improve energy consumption	Energy consumption/unit of transport	CITY MOVE, CITYLOG, DELIVER, CIVITAS ECCENTRIC, FREVUE, FURBOT, SMARTFUSION, V-FEATHER
Improve long distance-city distribution connectivity	% Decrease in operational handling	NEXTRUST, CIVITAS ECCENTRIC, SMARTFUSION, STRAIGHTSOL, VITALNODES

In *Figure 8* the % of projects targeting the different expected impacts from project calls are shown. In *Figure 9* the % of projects targeting the different expected impacts not explicitly mentioned by the topic are showcased.

It can be observed that the expected impacts achieved by the projects as the highest are related in *Figure 8*. The decrease in environmental impact can be achieved by increasing transport efficiency and the reduction of congestion. As well as an increase in transport reliability can be achieved by a decrease in travel times. The improvement of long distance-city distribution connectivity, the improvement of the energy consumption, the Decrease of overall transportation and logistics cost ad well as the achievement and increasing in modal shift to rail freight/waterways transport were validated in less than 50% of the projects.

% of projects targeting the different expected impacts
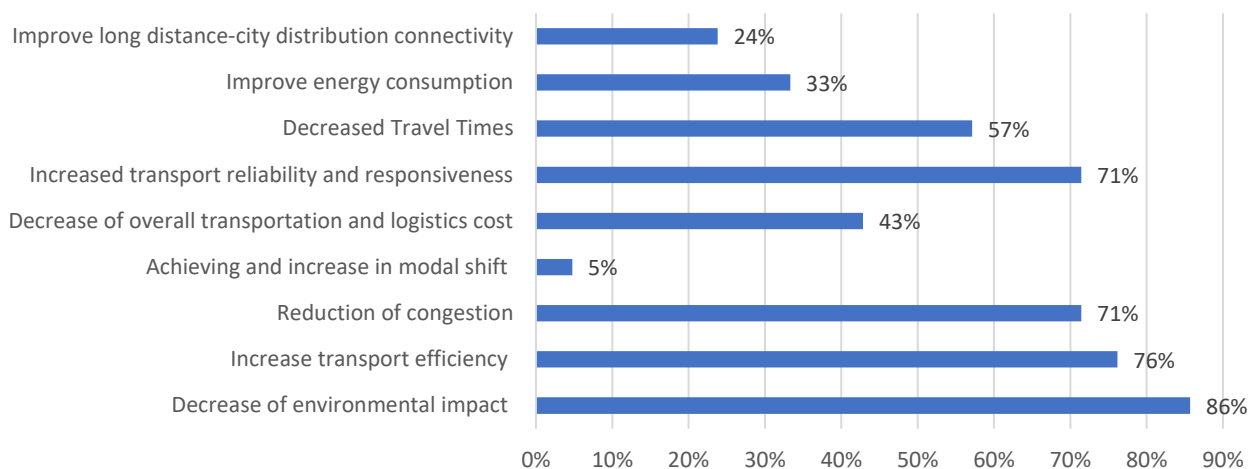
Figure 8. % of projects targeting the expected impacts from the Urban Logistics Cloud achieved by the projects.

Another finding is the fact that few projects (compared to the Coordination and Collaboration Cloud) achieved impacts not identified as expected for two of the topics validated:

- *Reduction of congestion on the road network*, 4 projects achieved this expected impact not included in the topic definition
- *Modal shift*, 1 project achieved this expected impact not included in the topic definition

Projects impacts beyond expected
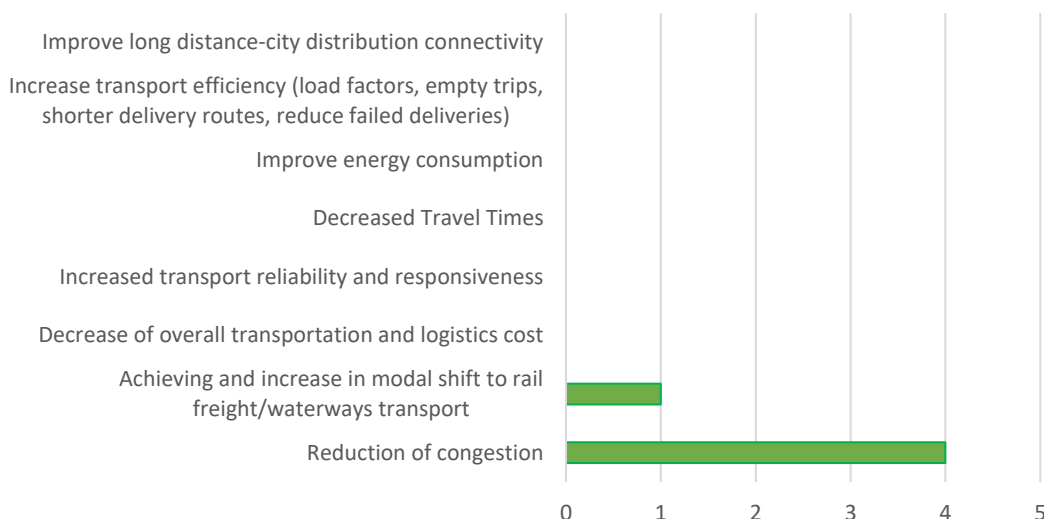
Figure 9. Projects impacts beyond expected for the Urban logistics Cloud.

With the analysis in *Annex II* (expected impacts from the calls vs the impacts achieved by the projects) we can further elaborate:

- o Synergic impacts: a *decrease of environmental impact* usually produced a *reduction of congestion on the road network* even though it was not identified as an expected impact on the topic

# 5 Analysis of the R&I impact per Cloud & key actions identification, characteristics, framework conditions and market assessment

Implementation Cases are concrete examples in which causal links between public R&I funding and technology, organizational or process innovation in a specific logistics area can be established. Indeed, Implementation Cases are outcomes where research results have been further developed and have been deployed as commercial solutions, have generated a new market or have contributed to new policies.

5.1 Coordination and Collaboration Cloud

BOOSTLOG has identified 4 Implementation cases in the framework of the Coordination and Collaboration Cloud by developing any logistics collaboration model or solution to analyse the R&I impact and the contribution to the policy objectives.

For the market understanding, an analysis of the current market size and trends has been performed in *Annex III*. The market analysis includes the characteristics of the logistics market (global and at regional level when required), 4PL, 3PL and main players, last mile delivery, cargo container and logistics software services. The values for the market included in the different Implementation Cases analysed are properly justified and explained in *Annex III*.

5.1.1 MIXMOVE

Technology: software – information system – physical internet service - interactive cloud platform.

Specializations: Digital cross-docking, Parcel-level optimization, SaaS, Cloud Logistics, Sustainability, End-to-end visibility, Smart City Logistics, Supply chain, Smart Parcel, logistics, lean logistics, green logistics, innovation, bar code standards, Logistics software, supply chain visibility, item level, resilience y flexibility.

Description: Multi-enterprise cloud platform that connects all data silos, unites teams and automates processes.

MIXMOVE introduction:

MIXMOVE LIGHTHOUSE is an interactive cloud platform on top of the customer's existing infrastructure designed to work with all logistic applications and partners. The platform allows teams to manage, predict and analyze every logistic event on product level in the best possible way, no matter where it comes from.

MIXMOVE[54] offers intelligent, horizontal collaboration between shipper, carrier, hub, distributor and the end customer. The aim is to increase load factors to boost efficiency and reduce costs, while at the same time creating more sustainable supply chains by making smart use of transport modes. The logistics process, taking place in terminals (nodes) is based on splitting logistics units down to parcel-level so that cross-docking can be

---

[54] *https://www.mixmove.io/en/*

used to produce logistics units with vastly improved load factors. Splitting up pallets down to parcel level ensures dynamically meeting customer needs. The solution offers resilience in case new barriers or disruptions should occur.

Achievements:

- 100% visibility and communication along the whole supply chain (direct communication)
- 96% utilization of logistics assets (35% reduction of transport costs, 50% reduction of CO_2 emissions, 90% fill of trucks)
- 100% delivery precision (real time tracking and delivery prediction)
- 100% data driven logistics (full visibility, central management, improved productivity)

Conditions met to success: right partners involved (key industrial partners), solution to reduce costs and increase efficiency (in terms of load factor).

MIXMOVE is the result of iCargo project. Among others, MARLO and DHL were involved in the consortium, they worked with 3M. 3M has a large number of products. By preparing customer orders at the factory or distribution centre, they needed significant space to "pick by order", and the resulting pallets were not stackable, hence one level of pallets was possible in trucks, resulting in low load factors. Delaying preparation of orders to the terminal closest to the customer, meant shifting from pallets to parcels, filling transport units as much as possible, thus increasing the load factor from 45 to 90%. To enable this process to be implemented in all terminals handling 3M cargo, without changing physical infrastructure or the existing information systems, 3M needed an information system to manage this new logistics process. This solution was developed by MARLO in the framework of iCargo jointly with DHL and 3M.

The success factors from iCargo were not only having the R&D expertise, but also an interested customer (3M) and a provider willing to exploit the project's outcomes (MARLO). As part of this exploitation exercise, in 2017 MARLO decided to form a new company, MIXMOVE, and transferred all the related IPR to the new company. In 2019 they were awarded cool vendor in the supply chain by Gartner.

Framework conditions and actions that supported this result

Framework conditions:

- Delivering a sustainable, low carbon society and help progress towards the Europe 2020 targets on climate and energy.
- ICT for low-carbon multi-modal freight and logistics covering technologies and services for multi-modal freight and logistics as well as ICT for clean and efficient multi-modal mobility for further improving energy efficiency and reducing CO2 emissions in all modes of transport for passengers and goods.
- Cooperative Systems for low-carbon multi-modal mobility covering cooperative applications and services for energy efficiency and eco-friendly mobility as well as a European Wide Service Platform (EWSP) for services leveraging those cooperative systems.

Actions that supported the expected results:

- Strengthening the position of Europe's logistics and freight industries in the marketplace for low-carbon products and services.
- Improvements in efficiency and environmental friendliness of mobility and transport in Europe. MIXMOVE solution achieves 50% reduction in CO_2 emissions in transport.

- Full integration of intelligent cargo items into the multi-modal transport infrastructure, with special emphasis on urban multi-modal logistics
- Widening the market for new ICT-based mobility and transport services in Europe and worldwide

Further development of the TRL level beyond the funding period: TRL6-7 → TRL 9

What started out as an EU-funded project in 2014, led to the birth of MIXMOVE in 2017. Since then, the company has helped customers level -up their logistics operations with the right technology, and this has resulted in better utilization of existing resources, increased fill rates, and improved planning.

MIXMOVE was appointed by the European Commission as BEST INNOVATION IN EUROPE in the category of ICT for Society and is a two-time recipient of the Physical Internet Venture Award. Today, MIXMOVE consist of about 40 people located across Europe. The headquarters are in Oslo, with people also located in Portugal, Austria, Denmark, Netherlands, Germany and Singapore. MIXMOVE is proud to be a small but global start-up that aims at innovating logistics towards a more efficient and sustainable industry.

Currently MIXMOVE is transitioning its growth path, incorporating artificial intelligence for decision support and digital twins for interoperability. The aim is to ultimately become a facilitator of Physical Internet Services. It should be noted that even if the solution originally was developed in close collaboration with 3M, the solution is generic and can turn any terminal into a "network node", without changes to physical or information infrastructure.

Level of deployment at company level and the estimated size of the operation for that company based on available benchmarks:

The MIXMOVE solution is currently operating in more than 30 terminals in Europe and the US. Approximately 150 million parcels have been moved using the solution.

Target market: shippers and 3PL.

Phase of deployment of the new product and services as well as the reached or targeted market.

The development of MIXMOVE LIGHTHOUSE as an interactive cloud platform matches TRL 9, an actual platform proven in operational environment deployed in the EU and US markets.

The target customers of MIXMOVE solution are shippers and 3PL companies. For this, an analysis of the current markets of 3PL and 4PL worldwide, Europe and the US was performed. From the market analysis the main values for Europe and US are:

Market	Value
Global logistics market size 2020	5.73 billion EUR
Global parcels market 2020	450,000 million EUR
Market size of 4PL logistics worldwide 2020*	53,460 million EUR
North America*	15,030 million EUR
Europe*	15,920 million EUR
Global 3PL market size (revenue) 2020	847,630 million EUR
North America	244,100 million EUR
Europe	158,660 million EUR
Global logistics software market size	4,150 million EUR

* Estimated value.

MIXMOVE is commercially fully deployed with clients in Europe and the US and has a significant market share with operations in more than 30 terminals. With only 5 years of trajectory, this means an early market entry with high penetration and a positive future perspective of increasing their market share significantly in the next years.

The specific solution provided by MIXMOVE is not largely implemented by competitors yet, giving MIXMOVE a competitive advantage to engage and consolidate new customers and become a leading company in cloud platforms for collaboration. Its capacity to integrate with the existing infrastructure, logistics applications and partners makes MIXMOVE a solution that has been 100% accepted by all the early adopters and full consolidation of customers (the solution can easily be integrated on top of the existing systems without any disturbance to the IT landscape).

Although MIXMOVE is a European start-up the company already operates globally. The main market of MIXMOVE is Europe and the US, the leading and largest markets for software logistics solutions in the world (both in development and implementation). With a big potential to continue to expand its services in these markets and Asia, MIXMOVE can consolidate as one leading company in the sector in Europe and other markets in the future.

Some loyal customers are 3M, Intercargo or DHL (the biggest 3PL in Europe) for which MIXMOVE has achieved a never seen collaboration to gain real time product visibility and an effective, sustainable and cost-efficient optimization of the logistic flow — at a glance + 90 % capacity utilization, - 35 % cost decrease and a CO_2 reduction of - 50 %.

Success case: SONAE is managing a fleet of more than 200 trucks. Some of the trucks are their own, while others are run by third-party transportation companies, yet all trucks operate interchangeably. SONAE decided to implement the MIXMOVE platform as an intelligent layer on top of their existing systems. The solution provided SONAE's transportation department with a complete overview of the store fulfilment process. Moreover, every store manager was given information about the items that were to be delivered on a specific day – including an exact estimated time of arrival (ETA). SONAE's «Transport Radar», as they now call the MIXMOVE solution internally, is integrated with multiple telematics equipment and solutions from the truck fleet. (https://www.mixmove.io/post/real-time-transportation-visibility-platforms).

MIXMOVE is a solution initially oriented to 3PL and shippers but as can be seen in the previous success case other customers like retailers, the case of SONAE, are interested in this service. This opens up possibilities for new markets and customers giving MIXMOVE a bigger potential to expand to the global market. A higher market share will provide a higher market penetrance considering the market acceptance accomplished by MIXMOVE.

MIXMOVE does not have direct competitors right now but we have identified some solutions targeting a similar market (always taking into account that MIXMOVE can easily be integrated on top of the existing systems and logistics applications, thus MIXMOVE is compatible with any other software solution in the market). Some of the key players in the market are: Softlink Global (United States), Schaefer Systems International Pvt Ltd (India), Oracle Corporation (United States), Blue Yonder (United States), TRANSPOREON GmbH (Germany), Royal 4 Systems (United States), 3PL Central LLC (United States), Abivin (Singapore),

Eyefreight (Netherlands), Soloplan GmbH (Germany), Ramco Systems Limited (India), HoustonTech (United States).

According to the global logistics software market size estimated at 4,150 million euros in 2020, the Total Addressable Market (TAM) for MIXMOVE is less than 1 digit (below 1%) due to its specific characteristics and value proposition. Due to this low market value, we cannot provide a quantitative analysis, but in a qualitative sense, the significance of this value is high (due to the integration capability of the solution with all infrastructures and systems combinations). The Serviceable Addressable Market (SAM) includes the European and US markets since there are no direct competitors nowadays. The Serviceable Obtainable Market (SOM) will be comparable to the SAM according to the resources of the company (their capacity to serve a growing number of customers).

Impact in the CLOUD → VERY HIGH	⭐⭐⭐⭐⭐

5.1.2 TRI=VIZOR

Technology: software – information system – horizontal collaboration partnership and collaboration platform – cross supply chain orchestration.

Neutral orchestrator that prepares, involves and supports companies in the processes of creation (as 'architect') and managing (as 'trustee') horizontal collaboration partnerships and platforms.

TRI=VIZOR introduction:

As the world's first impartial orchestrator for transport and logistics, TRI-VIZOR[55] proactively prepares, designs and operates horizontal partnerships and collaborative communities among shippers. By bundling and synchronizing logistic activities across multiple supply networks, they create double digit gains in cost, customer service and sustainability for their clients.

TRI-VIZOR has developed a strong vision on how logistics and supply chain management will evolve in the coming years and want to prepare companies and other organizations to anticipate on what is going to come. In essence, the current business models in transport and logistics will fail very soon due to low efficiencies caused by fragmentation and important capacity shortages. The new business models for smart and sustainable logistics will be based on sharing capacity, i.e. bundling of flows, clustering of activities, sharing services and pooling resources. TRI-VIZOR has demonstrated that horizontal partnerships and platforms are the most fair and appropriate way to realize this.

Achievements:

TRI-VIZOR is the first company in the world specialized in the creation and management ("orchestration") of horizontal partnerships in logistics. As an impartial trustee, TRI-VIZOR has developed unique solutions and technologies to help shippers, logistics service providers, governments and infrastructure operators to bundle

---

[55] *http://www.trivizor.com/*

and synchronize freight flows and to achieve breakthrough improvements in logistics cost, service level and carbon emissions. TRI-VIZOR builds sustainable logistics communities which are glued together by a fair gain sharing mechanism, an ICT cockpit or "logistics control tower" and a legal framework which is fully compliant with anti-trust laws. The first successful pilot projects are currently up and running.

The smart bundling of goods on the outskirts of the city immediately translates into a quarter fewer kilometers driven and 90% less emissions. By bundling and synchronizing logistic activities across multiple supply networks, TRI-VIZOR creates double digit gains in cost, customer service and sustainability for its clients.

TRI-VIZOR has demonstrated that horizontal partnerships and platforms are the most fair and appropriate way to realize this.

Some other innovative and ground-breaking projects of TRI-VIZOR include FJORDFRENDE (https://www.fjordfrende.no/) and CULT (https://www.cultcitylogistics.be/).

Conditions met to success:

Under the framework of CO3 project the right partners involved allowed to find synergy that resulted in a collaboration consolidation. This community involved 2 competitors making a very important aspect of this horizontal collaboration: how to cope with anti-trust laws. The development of antitrust compliance was crucial for the company-sensitive information was only shared with the TRI-VIZOR. The process was closely monitored by a specialized external lawyer and by the legal departments of both PepsiCo and Nestlé.

The agreement between the 2 companies and the selection of the logistics service provider (STEF) as fully responsible for the management of the administrative and financial flows. The neutral trustee was crucial in the collaboration evolution.

Development of new business models for smart and sustainable logistics based on sharing capacity demonstrating that horizontal partnerships and platforms are the most fair and appropriate way to realize this.

Framework conditions and actions that supported this result

Framework conditions:

- Optimising the global efficiency of transport system, enabling an effective use of the whole transport infrastructure and networks capacity and overcoming bottlenecks.
- Major reduction in CO2 emissions, with the emphasis on step-change research in all Surface Transport modes.
- Strengthening European competitiveness in all Surface Transport modes, through exploitation of the potential of eco-innovation, both to protect the environment and to offer competitive advantage for those which look at the possibility to create new markets.
- Deepening ERA in Surface Transport, by means of an ERA-NET Plus on electromobility.

Actions that supported the expected results:

- New business models developed by the industries in the direction of collaboration in managing and operating logistics.
- Demonstration - by means of use cases and comparison with baselines - that the practical application of these models improves both the quality and performance of the logistics chain. TRI-VIZOR directly achieved increased transport and logistics efficiency.

Further development of the TRL level beyond the funding period: TRL6 → TRL 9

The company originally raised as a spin-off of the University of Antwerp in 2008. In the framework of CO3 project[56], a horizontal collaboration community in fresh & chilled retail distribution between 2 Fast Moving Consumer Goods shippers (Nestlé & PepsiCo), a logistics service provider (STEF) and a neutral trustee (TRIVIZOR) was created. In 2010, the Belgilux Association of Branded product Manufacturers (BABM) brought together a group of retail suppliers to identify potential consolidation opportunities. The project took 2 years to reach its implementation phase with two companies, PepsiCo and Nestlé. The distribution synergy between the Belgian fresh networks of Nestlé and PepsiCo was simulated and the potential consolidation gain was calculated by the neutral trustee TRI-VIZOR in an 'offline' mode. Subsequently, a community was built around the two companies with TRI-VIZOR as the trustee providing the appropriate governance framework.

After CO3, TRI-VIZOR has further developed its strong vision on how logistics and supply chain management will evolve in the coming years. In essence, they claim that current business models in transport and logistics will fail due to low efficiencies caused by fragmentation and important capacity shortages. The new business models for smart and sustainable logistics will be based on sharing capacity, i.e. bundling of flows, clustering of activities, sharing services and pooling resources.

It recently teamed up with local business in Antwerp to launch the CULT project that consolidates logistics in the city centre, thus reducing emissions of urban logistics[37]. The companies Danone, Delhaize, Jacobs Douwe Egberts, Pro-Duo, Proximus, Telenet and Schoenen Torfs combine their deliveries of orders to retail outlets and individuals in the city of Antwerp and deliver them together.

The positive impact on mobility and the environment will increase as more companies join CULT (Collaborative Urban Logistics & Transport) for their goods flows. As community manager, TRI-VIZOR has set up the framework so that new companies as well as retailers in the city centre can quickly and easily join. Within this structure, companies - even competing players - can cooperate transparently and fully in line with existing regulations. Moreover, this structure is easily transferable to other cities.

Level of deployment at company level and the estimated size of the operation for that company based on available benchmarks:

No data of the level of deployment for the moment.

Target market: shippers

Phase of deployment of the new product and services as well as the reached or targeted market.

The development of TRI-VIZOR collaboration platform matches TRL 9, an actual platform proven in operational environment deployed in the EU market.

The target customers of TRI-VIZOR solution are shippers. For this, an analysis of the current markets 4PL worldwide, Europe and the U.S.A. was performed. The main values for the market uptake of TRI-VIZOR are compiled below.

Market	*Value*
Global logistics market size 2020	5.73 billion EUR

---

[56] *CO3 deliverable 4.5 CO³ Test Project Report: Horizontal Collaboration in Fresh & Chilled Retail Distribution*

Market size of 4PL logistics worldwide 2020*	53,460 million EUR
North America*	15,030 million EUR
Europe*	15,920 million EUR
Global logistics software market size	4,150 million EUR

According to the deployment of TRI-VIZOR, it is not possible to provide a deeper analysis including the level of penetration and market acceptance. TRI-VIZOR is not fully commercially deployed and available for all the customers yet, for the moment is not oriented to multiple shippers, operating only at domestic level and working at parcels and pallets level. The solution has been implemented in different use cases with important companies in the market and currently is working on the scalability by developing sectorial approaches for consolidating new customers (as the CULT project).

From the point of view of project implementations, the solution implementation starts with a project phase to get something structural with the company, with this strategy TRI-VIZOR has engaged and consolidated important companies as users of its solution with a complete acceptance.

TRI-VIZOR has joined the market with a business model based on projects (developing the application for each partner as in the use cases model from the project phase).

Impact in the CLOUD → HIGH   ⭐⭐⭐

5.1.3   SMARTBOX

Technology: cargo container.

SMARTBOX[57] is an innovative and reusable transport box to increase efficiency and sustainability in logistic processes.

SMARTBOX introduction:

It was developed by GS1 under the framework of the "smartBOX" project[58] which developed the technical design of the smartBOX as reusable container, designed a standardized pooling system including tracking and tracing technology and a business model for intelligent order control and cost splitting, designed of vandalism-proof pick up and drop off terminals to be implemented at public hot spots as well as housing complexes, developed a comprehensive, intermodal transport concept to enable autonomous and bundled transports. Indeed, Shared Load Carriers is one of the main elements towards Physical Internet[59]. The Modulushca[60] project developed the initial principles.

---

[57] *https://www.gs1belu.org/sites/gs1belu/files/2021-04/GS1%20Innovation%20Caf%C3%A9%20GS1%20SMART-Box.pdf*

[58] *https://packagingrevolution.net/gs1-smart-box-is-going-live/*

[59] *https://www.pi.events/IPIC2021/content/s1-shared-load-carriers-manufacturer-retail-distribution-networks*

[60] *https://cordis.europa.eu/docs/results/314/314468/final1-modulushca-finalreport-sectiona.pdf*

The GS1 Smart-Box has cleared an important hurdle with the test run between industry and retail and is now under series production. The first of the 100,000 blue series containers were delivered at the end of April 2021. With a size of 600x400x211 mm, they form the basis for the later container family. These dimensions have been chosen to exploit the EUL loading heights of 1.20 m and 2.40 m, thus enabling optimum transport and storage utilization for fewer transports and, not least, lower CO_2 emissions.

In the test run, the gray-colored prototype, the so-called 0-series, was tested for performance in automated processes as well as smooth identification via applied GS1 barcodes, among other things. Industry and retail sent a total of 500 containers through their production and packaging processes. For example, they scrutinized the process in the distribution center. Product manufacturers and retailers both participated in the test. On the industry side, Beiersdorf, Cosnova, Henkel, Kao, L'Oréal, and Procter & Gamble took part. From the retail side, dm-drogerie markt, Edeka, Müller and Rossmann participated.

Achievements:

The GS1 SMARTBOX delivers efficiencies that result from modularity and standardization: reduction in handling expenses, reduction in disposable packaging in retail, volume-optimized return, digital recognizability and reduction of the CO2 footprint by up to 80%.

The box shows important advantage covering the entire logistics cycle from the supplier's production plant to retail stores such as increased efficiency and more optimal environmental compatibility including reduced material usage which results in:

- Lower cost (avoid extra handling)
- Lower complexity (only one load carrier in the entire process)
- More flexibility in peaks periods for storage
- Less waste (cardboard)
- Open pool based on GS1 standards

The business case of SMARTBOX is based in three main pillars:

1. Optimizing loading capacity
   - change from stacked consignments with American boxes to EUL 1/2 consignments with the GS1 SMART-Box
   - Reducing pallet space (transport)
   - Reducing cost for pallet cycle
   - Reducing administration expenses
2. Optimizing of processes
   - change from opening the cardboard box, repacking the goods and dispose of packaging material to an optimized flow
   - optimized picking process both at the manufacturer (mixed pallets) and the retailer
   - saving in material costs
3. Optimal transport and storage utilization

The additional potential of SMARTBOX includes:

- savings on foils and labels
- using serialized GRAI for identification instead of a separate article label (GTIN) → SSCC only on pallet

- the serialized GRAI is fixed to the box across all processes
- the removal of the label is not necessary after each circulation and thus reduces the pooling costs

Conditions met to success: right partners involved (key industrial partners), solution to reduce costs and resources optimization.

Framework conditions and actions that supported this result

Framework conditions:

- The optimisation of the global efficiency and safety of the transport system (by application of Intelligent Transport Systems and logistics), making efficient use of infrastructure and network capacity, with the aim of offering safe and seamless transport and mobility to all European citizens, as transport is also crucial for social inclusion.

Actions that supported the expected results:

- A multiscale standard set of logistic units will lead to breakthrough asset utilisation with a dramatic decrease in cost and carbon footprint of supply chains (by a factor 4 or 5).
- Facilitate the integration of today's independent supply chains, overcoming current physical barriers to collaboration. SMARTBOX achieved a real collaboration environment.
- Enable a completely new interconnected logistics organisation. This new organisation, similar to the Internet, with its standardised and shared resources, will itself be an enabler for improving services, increasing productivity, reducing the environment footprint of logistics by better use of transport means and encouraging a shift to cleaner ones, improving quality of life in urban areas, as well as the quality of logistics jobs, and providing a stimulant for breakthroughs in logistics innovation.

Further development of the TRL level beyond the funding period: TRL3 → TRL 8

SMARTBOX needs to define and install an industry standard for boxes and load carriers that can be shared and interoperable across supply chains to reduce waste and enable further sustainability increasing assets utilization.

GS1 is playing a leading role to facilitate and enable this transformation with the GS1 SMART-Box project to be in operations soon in the German Market involving leading retailers and brands.

After Germany, other markets will adopt the standard creating additional scale and enabling other category products to be incorporated to the pool.

Level of deployment at company level and the estimated size of the operation for that company based on available benchmarks:

SMARTBOX solution has not been deployed at the time of this report. Its first phase of deployment is considered to reach TRL9 in the short term with actual system proven in operational environment.

Target market: shippers

Phase of deployment of the new product and services as well as the reached or targeted market.

The development of SMARTBOX matches TRL 7, with the cargo container prototype demonstrated in an operational environment.

The target customers of SMARTBOX solution are shippers. For this, an analysis of the current markets 4PL worldwide, Europe and the U.S.A. was performed. An attempt to quantify the market that could be impacted by SMARTBOX we provide the following values:

Market	*Value*
Market size of 4PL logistics worldwide 2020*	53,460 million EUR
*North America**	15,030 million EUR
*Europe**	15,920 million EUR
Global shipping container market 2020	5,840 million EUR

The global shipping container market size was valued at USD 6.41 billion in 2020 (https://www.grandviewresearch.com/industry-analysis/shipping-container-market-report) and is expected to expand at a compound annual growth rate (CAGR) between 4.3% and 12.0% from 2021 to 2027 (https://www.alliedmarketresearch.com/shipping-containers-market - https://www.mordorintelligence.com/industry-reports/global-container-shipping-market).

The market is expected to be driven by maritime trade, expanding penetration of the e-commerce industry, digitization in shipping container space, and increasing demand for specialized shipping containers by the department of defense.

20' and 40' are the most popular sizes of shipping containers as of 2021. Although based on application shipping containers are often manufactured in a variety of sizes such as 8', 10', 48', 53', and others. Their increasing demand for transportation of a variety of goods such as food, pharmaceutical, automotive components, and agricultural products is expected to support industry growth.

The significant developments in commercial vessels and innovation of efficient and better cargo ships equipped with advanced technology such as navigation systems, advanced sensors, and other components are accelerating the demand for cargo transportation through ships, which is further fueling the growth of the market.

According to the deployment phase of SMARTBOX, it is not possible to provide a deeper analysis including the level of penetration and market acceptance. For the moment, SMARTBOX has shown a high acceptance at project level and demonstrations at operational level with important companies in the sector. SMARTBOX will start operating in Germany soon (its local market) and open a new market as a reusable cargo container standardized for the introduction of the Physical Internet in the industry and logistics services.

SMARTBOX has prospects of achieving an important market share in its category of sustainable cargo containers, reusable and standardized. The reach of SMARBOX is linked to GS1, the solution developer and exploiter, as a referent in standardization in Europe GS1 develops global standards for identification as well as for data capture and sharing bringing together different organizations, their suppliers and logistics service providers. GS1 counts on more than 7,500 Belgian and Luxembourg companies affiliated and using the GS1 standards. This will provide a safe starting point for the market entrance of SMARTBOX, first implementation cases and scalability phase, giving the solution an easy market entrance. The first deployment phase of SMARTBOX sounds promising and it is expected to be well accepted by the European market.

Once SMARTBOX starts operating, the early adopters will need to have an investment in the SMARTBOX cargo containers. As an investment and adjustment in the traditional operations of the company will be an

organizational decision (at high-level management) oriented to increasing competitiveness, positioning the company as an innovative business and as a commitment to sustainability. This first stage will take at least 5-10 years to allow the early adopters to adjust their activity and have benefits and competitive advantages. The requirement of such investment and tuning for the company will prevent some companies to implement the SMARTBOX solution but will consolidate the early adopters, and the following customers to come, with a complete market acceptance. The early adopters will drive the market and will be the lure for new customers. For this, the importance of early adopters to be relevant companies in their sectors working as innovative models to set the market tendencies. This will secure a successful implementation of the SMARTBOX solution. GS1 has the contacts as well as the engagement and commitment of ideal companies to start the solution to operate.

Impact in the CLOUD → VERY HIGH

5.1.4   CRC SERVICES

Technology: digital solution - platform

Digital solutions for transport organization via the CoLivRi web platform. Digital team specialised in operational research, which models, develops algorithms and integrates them into the CoLivRi platform.

Description:

CRC Services[61] has developed a model to help companies to mutualize their flows for the last 100 km of goods delivery. The model allows suppliers to deliver goods from their distribution centers in collaboration with other supplier and to make savings by optimising orders and vehicle loads.

CRC Services aims to reduce the impact of GHG emissions from freight transport by facilitating the emergence of shared, optimised and sustainable transport solutions.

ADEME in France (Agency for ecological transition) enabled the development in a first place. ADEME selected industrial and logistics partners proposing sustainable solutions to be developed in the framework of collaborative projects, with other industries and operators. CRC Services has been working on the collaborative model, in "project mode", for 5 years with the support of ADEME. This model has proven to be more efficient for small orders in the industry, improving the performance in economic and environmental terms. The project´s full trucks optimise the service by 10 to 15 points and reduce GHG emissions by 20 to 30 %. After this project, CRC Services expanded to the north of France.

To improve the model, CRC Services thought about the need of having not only a physical approach but a digital one, introducing algorithms to optimize the delivery and all complex activities as well as show the performance to all the actors. With this in mind, CRC Open Network Project was born, partially funded by the French Government (2016-2018). The partners, 4S Network, CRC Services, GS1 France, ARMINES and TAB

---

[61] http://www.crc-services.com/

(https://librairie.ademe.fr/mobilite-et-transport/559-crc-open-network.html), aimed to set a digital platform to put all the algorithms and KPIs to help people to collaborate.

CRC Open Network project started with a physical approach to turn into a digital approach. The project implemented several use cases being CRC Services one of them. After 6 months the use case started to go into the market with the interest of 2 companies. The first one a supplier of sandwiches and salads (with a few hours of goods duration). In this case, an algorithm to analyze historical data and optimise the economic performance of deliveries was implemented. The company could organize the deliveries by themselves (optimizing the in-bound full trucks) and save money. The second use case was the "Mut@Log" project, initiated by Leroy Merlin, a French multinational company specialising in DIY, construction, decoration and gardening. The company wanted to improve the delivery of their suppliers to a delivery service of 97-98%. The painting material was delivered directly to the shops from the producer (around half pallet daily to all the shops). The company wanted the suppliers to deliver full trucks as much as possible and use the free space for other shops if possible. From this success, two new implementation cases for CRC Services came along.

Achievements:

CoLivRI platform main achievements:

- CoLivRi Optimisation supports a company in the transformation of their transport strategy up to its operational implementation, thanks to customised optimisation algorithms based on the latest scientific advances.
- CoLivRi Traceability connects to the carriers or an organization in just a few clicks and allows to trace the flows and monitor the performance in real time.
- CoLivRi Mutualisation assists a company in finding mutualisation solutions: as a trusted third party, for the optimisation of the network, or in the integration of the flows into the CRC network.

Conditions met to success:

CRS Services was born as a subsidiary of 4S Network to operate sustainable supply chains working in loop, setting up plans to reduce the carbon footprint. Many people were contacted in the field to better understand their activity and to integrate them into the use cases. An important asset to the success of CRC Services was the large number of interested contacts and the right time for this kind of developments in the companies. CRC Services knew that it was important to reach the market and to have implementation cases with potential customers.

Key for the success of CRC Services. Combination of research and development with applied use cases in companies. These implementation cases allowed CRC Services keep working with the companies after the success of the cases overcoming the general barriers and hurdles found in collaborative models. It is also worth to mention the importance of customers in the developments. Retailers are the ones initiating the projects to meet a specific need, then the shippers are involved and contracts are stablished between them and the carriers and/or logistics providers, the retailer not being directly contractually. The Retailer is "just" the prescriber of the project and drives the overall performance.

The partners involved in the project that enabled the developments used by CRC Services were a mix of small and medium-sized enterprises as well as larger groups and research organizations. These partners covered all the roles and profiles needed to the success of the development and worked together in the research part (Academia) but also implementing and creating business models. The communication between the research

and the market implementation was crucial for the success of this case, speaking the same language and pursuit the same goal. This collaboration is the solution to go from research to implementation, as for funding for this step is not easy to obtain and is not affordable for all the companies (usually a mix of grants and repayable advances), CRC Services has found a way to accelerate this uptake by effective implementation cases, continuation of the services and sustainable relationships with the companies.

Framework conditions and actions that supported this result

French project in collaboration with ADEME (Agency for ecological transition). ADEME selected industrial and logistics partners proposing sustainable solutions to be developed in the framework of collaborative projects, with other industries and operators.

Taking into account the European Framework conditions for horizontal collaboration in logistics we have identified the following conditions that can be applied to the funding scheme acceded by CRC Services:

- Optimising the global efficiency of transport system, enabling an effective use of the whole transport infrastructure and networks capacity and overcoming bottlenecks.
- Major reduction in CO_2 emissions, with the emphasis on step-change research in all Surface Transport modes.
- Strengthening European competitiveness in all Surface Transport modes, through exploitation of the potential of eco-innovation, both to protect the environment and to offer competitive advantage for those which look at the possibility to create new markets.

Actions that supported the expected results:

- New business models developed by the industries in the direction of collaboration in managing and operating logistics.
- Demonstration - by means of use cases and comparison with baselines - that the practical application of these models improves both the quality and performance of the logistics chain. CRC Services directly achieved increased transport and logistics efficiency.

CRC Open Network Project was born, partially funded by the French Government (2016-2018). The partners, 4S Network, CRC Services, GS1 France, ARMINES and TAB (https://librairie.ademe.fr/mobilite-et-transport/559-crc-open-network.html), aimed to set a digital platform to put all the algorithms and KPIs to help people to collaborate.

Further development of the TRL level beyond the funding period: TRL6 → TRL 9

In December 2015, CRC Services was created as a subsidiary of 4S Network to meet market demand for the pooling of goods transport. After a few months of testing the "Collaborative Routing Centre" concept as part of an R&D project carried out in collaboration with 4S Network, Mines ParisTech and GS1 France and supported by Ademe and Club Déméter, the company CRC Services sas was created.

A few years later, CRC Services extends its ambitions and offers digital solutions to players of all sizes wishing to improve the performance of their transport organisation via the CoLivRi web platform. CRC Services relies on a digital team, specialised in operational research, which models, develops algorithms and integrates them into the CoLivRi platform.

Level of deployment at company level and the estimated size of the operation for that company based on available benchmarks:

CRC SERVICES size of operation:

- 22 companies have already chosen the CoLivRi solution
- 10% of GHG saved on average with CoLivRi
- + more than 200k pallets managed by CoLivRi
- ROI < 1 year thanks to the optimisation of your transport organisation

Target market: last mile delivery providers

Phase of deployment of the new product and services as well as the reached or targeted market.

The development of CoLivRi solution developed by CRC SERVICES matches TRL 9, an actual platform proven in operational environment deployed in the French market.

The target customers of CoLivRi solution are last mile delivery providers. For this, an analysis of the last mile worldwide market, Europe and regional was performed.

CATEGORY	VALUE
Global last mile delivery market 2020	98,470 million EUR
Europe	819 million EUR
Germany	22.32 million EUR
France	6.5 billion parcels handled in 2019
	1.5 billion parcels were delivered in the courier, express, and parcel (CEP) market in 2020
Global transportation management system market (TMS) 2020*	5-8 million EUR
Investment in TMS in 2018	38 % of shippers and 67% of 3PLs
Global last-mile delivery software market 2020*	6,186 million EUR

*Average of several sources

Market penetration: CRC services has a medium level of penetration in France (their local market, estimated in 5bilion parcels according to the previous values). Since they only operate in France, the level of penetration at European level is low but with a huge potential to expand to synergic markets (like Belgium) and close markets of big size as Germany.

Market acceptance: all the customers of CRC services using the CoLivRi solution are loyal to the company and continue using their services. The level of acceptance since the project face has been very good and the first customers engaged in the first stages of CRC services continue as clients.

TAM-SAM-SOM analysis for CRC services:

- Total Addressable Market (TAM). The total addressable market of CRC Services includes the last mile delivery market. In this phase, CRC services operates in their local market (France, with a TAM of 5 billion parcels) but they can expand to Europe in the next stages and finally to the global market.
- Serviceable Addressable Market (SAM). Taking into account the novelty and characteristics of CRC solution, there are not many competitors in the digital platform software solutions right now. This gives CRC services a good opportunity to address an important part of the French market right now.
- Serviceable Obtainable Market (SOM). According to their resources (small size company and customized products), CRC services has a reduced SOM with a high potential.

The main competitors in the current landscape for CRC services are: TURVO (https://turvo.com/) (United States), ROSEROCKET (https://www.roserocket.com/) (Canada), **SupplyStack** (https://www.supplystack.com/) (Belgium), MYCARRIER (https://go.mycarrier.io/) (United States), MASTERY (https://mastery.net/) (United States).

From them, only SupplyStack can be competitor in the next years due to the proximity (with operations in Europe) and would be mayor competitors if CRC Services takes the step and starts operating out of France.

Impact in the CLOUD → VERY HIGH

5.1.5   Conclusions for the Coordination and Collaboration Cloud

The analysis of the implementation cases included in the Coordination and Collaboration Cloud shows a path implemented for years (10 years on average) to achieve an impact in the market with the associated high impact on the sector. The European funding which made possible the development of the project was the first step in this roadmap, allowing the first development of a case of success. This success requires, as indicated in the implementation cases, the participation of the right partners (companies in the case of implementing results and being competitive in the market) as an essential requirement. A company committed to the project results as a competitive advantage for its own business is a guarantee of success.

5.2   Urban Logistics Cloud

Implementation cases and projects selected for the urban logistics cloud are different from the cloud report on Coordination & Collaboration which focused on commercial implementation and creation of business.

Today, the landscape of urban logistics has been shaped by many EU funded projects that had been a pioneer in many new solutions, results in changes in policy and business models. As urban environment is complex, concrete implementation of business models and policies can take a very long time. However, the BOOSTLOG project aims to acknowledge those pioneer projects that have initiated discussions and policy developments in urban logistics, even though concrete implementations have not yet been completed.

BOOSTLOG has identified **7 Implementation cases** that significantly impacted urban logistics. All implementation cases are described focusing on a short summary, its pathway from the project stage to its implementation and, where available, its potential for growth and replication.

5.2.1   Rome Logistics Living Lab

Introduction

The LLL is a participatory co-creation laboratory that aims to systematically involve public and private actors of city logistics in Rome to carry out innovative and shared projects, in order to support the implementation of the freight-related measures included in the Sustainable Urban Mobility Plan of Rome.

Pathway from the project stage to its implementation

The LLL of Rome was established permanently in the wake of the CITYLAB project. This was formalized in 2019 through an administrative act by the Deputy Mayor for Transport, describing the LLL elements and its functioning. CITYLAB has developed a methodology and a conceptual framework to set up local City Logistics Living Labs. The methodology is based on concrete case studies, that the seven partner cities have implemented over three years and in which local stakeholders have been involved. In the case of Rome, the case study promoted the co-design and co-creation of an innovative circular recycling system that integrated direct and reverse logistic flows in the university area. The pilot's lessons learned were used on the one hand to define the *City Logistics Living Lab Handbook*, which draw upon the practical experiences of the cities involved, on the other hand to guide the activities of the **Logistics Living Lab** (LLL)[62] of the city of Rome.

Achievements and influence on policy

In the LLL, all stakeholders contribute to achieve an organic and integrated policy framework for the city's logistics, also in sustainable planning for the Rome Metropolitan area. Among LLL participants: Municipality and Province of Rome, Lazio Region, ATAC (PT Operator), AICAI (Italian Association of international carriers), Confcommercio (National Association of Trade Enterprises), Amazon (logistics service provider), and Poste Italiane (postal company), the main couriers and logistics companies such as UPS, DPD Group, DHL, FedEx / TNT, GLS, FERCAM, FM Logistic, Spedire Roma, as well as cargo bikes couriers (CORRO, etc.) and manufacturers (Piaggio).

Several stakeholders have requested the LLL to support the launch and the roll-out of experimental projects for the optimization of the urban distribution of the last mile. In 2021, TRElab and RSM have therefore launched a *Call for Ideas*, to select relevant pilots. The projects range from recharging services for electric commercial vehicles, to systems for the collection of packaging with reverse logistics services, from hubs in the spaces of local markets to value-added services for riders. With the increase in e-commerce and the consequent fragmentation of deliveries, operators consider it essential to test and implement new delivery methods and business and operational models to make distribution more sustainable and optimized, also with the use of vehicles at zero emissions and cargo bikes. Some of the proposals have been embedded in ongoing projects or under preparation

Conditions met to success: involvement of all the key stakeholders, cross-disciplinary group, participatory co-creation.

Impact area and level

Co-creation with key stakeholder, local level

Potential for growth and replication: LLL is a cross-disciplinary group of leading academics focusing on transportation research. LLL is an independent, cutting-edge experimentation environment where academics, policy-makers, entrepreneurs and citizens work together to co-create effective, efficient and sustainable transport solutions. LLL provides data, information and knowledge to help cities and regions create an evidence-based ground to define their innovative mobility policies and measures. The methodology and a conceptual framework developed to set up this participatory co-creation laboratory can be easily replicated in other cities. It can be replicated in other cities by:
  1. Defining the living lab ambition, objectives and scope;

---

[62] http://www.trelab.it/living-lab/ ;

2. Creating the core living lab team;
3. Selecting an appropriate living lab governance model;
4. Performing analysis of city logistics ecosystem;
5. Identifying potential ideas and cases to develop within a living lab
6. Developing a monitoring and measuring system for living lab experiments

Impact in the CLOUD → HIGH   ⭐⭐⭐⭐

5.2.2   Declaration of Intent: Call for zero emission freight vehicles

Introduction

With the Call for zero emission freight vehicles, the undersigned companies, countries and cities commit to reducing emissions from the freight sector by stimulating the accelerated production and use of zero emission freight vehicles through collective action, in order to improve air quality and contribute to meeting the Paris Climate Agreement targets.

Pathway from the project stage to its implementation

Starting from FREVUE results, highlighting the technical and operational suitability of fully electric freight vehicles and also their limited availability and high prices, the Transport Decarbonisation Alliance, supported by the Polis Network, Climate Group's EV100 initiative and CALSTART has further strengthened this aggregated demand signal through the "Call for Zero Emission Freight Vehicles"

Achievements and influence on policy

After the FREVUE Electric Urban Logistics[63] project was finished, this demand signal was further strengthened in 2019 by the collective effort of the "Call for Zero Emission Freight Vehicles". 84 organizations signed the call, covering 294,628 zero emission freight vehicles in total. (208,154 vehicles below 3.5 tonnes; 35,822 vehicles between 3.5 and 7.5 tonnes; 50,652 vehicles above 7.5 tonnes). It was initiated by the Transport Decarbonisation Alliance and supported by the Polis Network, Climate Group's EV100 initiative and CALSTART. The high number of vans and trucks represented by the signatories raised an meaningful indication on the actual demand to vehicle suppliers.

Conditions met to success: key stakeholders involvement, collective action

Impact area and level

Impact on the market; global level

Potential for growth and replication

The aggregated demand signal later led to the Global Memorandum of Understanding on zero-emission medium and heavy duty trucks, launched at COP26, where 15 countries commit to 30% of new sales to be zero-emission by 2030 and a 100% before 2040. On the side of logistics operators Climate Group EV100 is currently working on a collective purchasing and/or contracting commitment in line with the MOU goals.

---

[63] https://frevue.eu/declaration-of-intent/

Impact in the CLOUD → VERY HIGH

5.2.3   SEUL- Smart Electric Urban Logistics

Introduction

SEUL project developed a smart charging system adopting an 'intelligent' approach to charging. It spreads charging throughout the night so that the building can use the power it needs to run the business of logistics (lights, sortation machinery and IT), while also ensuring that all EVs are fully charged by the time they are needed in the morning, all while never exceeding the maximum power available from the grid.

Pathway from the project stage to its implementation

Building upon the FREVUE project results demonstrating that electric vans and trucks can offer a viable alternative to diesel vehicles, some of the consortium partners participated in further projects aimed at supporting the wider transition to electric vehicles for larger commercial fleets.

In the SEUL initiative UPS partnered with UK Power Networks Services (UK Power Networks Distribution Network Operator was the partner to FREVUE) and Cross River Partnership (coordinator of FREVUE project) and gained support from the UK government through Innovate UK.

Achievements and influence on policy

The successfully commissioned smart charging system will now allow UPS to electrify and charge its entire central London fleet of 170 vehicles without further costly and disruptive physical grid reinforcements. The 20 project vehicles are already contributing to cleaner air, achieving estimated well-to-wheel CO_2e emissions savings of 65% compared to diesel.

The system comprises of an Active Network Management system coupled with an Energy Storage System (ESS) that has the capability of dynamically controlling the local demand and was the first of its kind applied in a Business-as-Usual environment.

In September 2020 SEUL won[64] two Global Good Awards 2020, the first one recognising technology products that have generated a positive impact for the environment or community and helped to improve quality of life for people or the planet a local level; the second recognising the three most innovative entries from across all categories in the 2020 awards programme.

More recently, SEUL has given rise to a successor initiative EFLES (EV fleet-centred local energy systems), with UPS again partnering with UK Power Network Services and Cross River Partnership, but this time adding the energy software specialist Moixa. A vital dimension of understanding EFLES is the continuity among the different initiatives. The scope of the EFLES project was built based on the findings of the previous two projects and it constitutes another innovation project supported by Innovate UK. Where SEUL concentrated on reducing or eliminating the need for costly and disruptive network upgrades, EFLES is focused on unlocking the value of optimising the timing of the purchase of energy. Through the EFLES project, UPS can maximise the use of the existing electrical infrastructure developed through the SEUL project and optimise on-site

---

[64] https://crossriverpartnership.org/news/seul-wins-big-at-the-global-good-awards-2020/

operations. With many large cities in Europe and around the world beginning to limit access to their central commercial and residential zones, where only zero-emission or compact sized vehicles are allowed, developing and deploying these concepts and technologies helps UPS to be prepared to best serve the communities in which it operates

Conditions met to success: key stakeholders and big players in the sector involved, support from government

Impact area and level

The combination of various technologies, e.g. electric vehicles, charging infrastructure, and energy storage has enabled an integrated solution that resulted in approximately 65% of emission reduction with positive impacts on climate action.

Potential for growth and replication

The lessons and understanding gained from all these projects are directly transferable to other sites across the UK and around the world. They support a wider roll-out strategy for electric vehicles globally.

The development of effective charging infrastructure is part of a larger global effort by UPS to scale up the electrification of its fleet.

Central to this effort is UPS's investment in UK-based Arrival – a developer of electric vehicles. UPS have committed to purchasing some 10,000 of these vehicles for deployment in Europe and North America. In addition to collaborating with Arrival to develop electric vehicles and advanced driver-assistance systems, UPS is also a strategic investor in the company – having a taken a minority stake as a demonstration of long-term commitment to the strategy.

Since its inception in 2000, UPS's alternative fuel fleet has driven more than 1 billion miles (1.6 billion kilometres) globally. This has saved more than 60 million gallons (227 million litres) of conventional fuel and now constitutes a 'Rolling Laboratory' of more than 13,000 vehicles, or a little over 10% of the global fleet.

Impact in the CLOUD → VERY HIGH	⭐⭐⭐⭐⭐

5.2.4   Padova Cityporto

Introduction

Cityporto[65] is an Urban Consolidation Centre (UCC) service operational in Padua, Northern Italy, focusing on deliveries to the central area 'Low Traffic Zone' of 830,000 m^2 The deliveries are performed by 11 LNG-powered vans. The depot is a 1000 m2 wide urban consolidation platform located within the freight village. Cityporto is one of the few successfurban logisticsexperiences of this type in Italy. The model is taken as an example by many other Italian cities and is studied every year by numerous foreign delegations.

Success factors are[66]:

---

[65] https://www.interportopd.it/cityporto/

[66] https://www.interportopd.it/files/Presentazioni/Cityporto_Padova_EN_2022.pdf

- Stakeholders involvement and full support of Municipality
- Industrial plan focused on economic sustainability
- Voluntary subscription of the operators to the service
- Location of a freight village close to the urban area
- Gradual steps of implementation of the activities

Pathway from the project stage to its implementation

The Interporto Padova (Padova Freight Village), partner of the MOSCA project, tested the MOSCA TOUR modurban logisticse. As preliminary activity of the test implementation, distance and travel matrices over a set of time, order data (from operators) and fleet data (from carriers in term of fleet composition and vehicle type) have been defined to generate an efficient set of routes for the distribution activities.

This allowed Interporto di Padova to quantify the distribution flows of vehicles accessing the LTZ from the freight village, contributing to the decision of Padua Freight Village to create an urban goods distribution service, Padova Cityporto, launched in April 2004 (one year after the end of the MOSCA project), thanks to the enstablishment of a Protocol Agreement between the Municipality, the Chamber of Commerce of Padova, the local Transport Companyi and Interporto di Padova.

Achievements and influence on policy

From 2005 to 2019 Interporto performed 1,120,000 deliveries, ensuring a tangible improvement of the urban environment by reducing traffic and pollution. CityPorto had the merit of drawing attention to the importance of collaboration between private and public stakeholders, establishing the right dialogue and alignment of challenges in the city. The policy support from the municipality has been fundamental. The vehicles used for the service have preferential lanes, free access to the city and are able to park inside the limited traffic zones at any time of the day.

Conditions met to success: agreement between key stakeholders to boost the action, key stakeholders involved, support from the municipality

Impact area and level

Impact on logistics operation. Local level. The urban distribution service provided considerable and measurable positive effects on traffic congestion and pollution.

Potential for growth and replication

The urban distribution service has proven feasible and financially self-sustainable after a medium-long period (8 years since its implementation), proving considerable and measurable positive effects on traffic congestion and pollution. Cityporto has been operative since April 21, 2004, and is one of the few experiences of this type that has been successful in Italy. The model has been taken as an example by many other Italian towns, and every year it is studied by numerous foreign delegations.

Interporto Padova also supplies its own management software for those companies that wish to develop this type of activity. The service is dedicated to the subcontracted and direct goods hauliers who work in the city, and will also be extended shortly to perishable goods delivery.

Impact in the CLOUD → VERY HIGH	⭐⭐⭐⭐⭐

5.2.5   VISEVA-W

Introduction

VISEVA-W is a module complementing the freight related part of urban transport planning and optimisation from the public side, but also improving the planning tools for the private side. VISEVA-W is now integrated into the overall model structure of the VISEVA model for passenger transport demand and the PTV's VISUM model for traffic assignment, helping transport planners in conducting traffic analyses for cities and optimising the overall transport system.

Pathway from the project stage to its implementation

One of the module developed by MOSCA project is MOSCA FREIGHT (VISEVA-W). VISEVA-W integrates freight transport data into urban transport models, allowing modeling urban freight traffic and it was tested in Chemnitz. The testing of the MOSCA-FREIGHT (VISEVA-W) model showed that the set up of a demand model for urban business traffic and freight transport is possible and useful. For the Chemnitz example, the efforts for data collection were rather high but could easily be reduced by an aggregation of the used industry sectors (both origin and destination industry sectors) and by adapting the data collection concept to the specific data availability in a city. In any case, it is fair to conclude that the MOSCA-FREIGHT (VISEVA-W) demand model for urban business traffic and freight transport works well and meets the requirements of the City of Chemnitz. The result of the work was a complete reflection of the urban traffic demand (business traffic matrices (number of trips) for four vehicle types and their assignment on the network.

Achievements and influence on policy

Main results achieved are:

- Demand model for urban freight transport is possible and useful
- The effort for data collection/mining depends on the availability of behavioural data and the definition of freight traffic classes (VISEVA supports individual definitions of freight traffic classes)
- The software is a pioneer in integrated management of freight and passengers transport modeling.
- The assignment on the network delivers traffic flows for a range of different freight and passengers transport vehicle types
- deep analyses of freight transport in connection with the passenger transport is possible, to support city traffic management

The use of VISEVA allows cities to conduct traffic analyses optimising the overall transport system

Conditions met to success: proven benefits for public and private side, successful data collection, industrial stakeholders engaged

Impact area and level

Impact on transport planning at local level.

Potential for growth and replication

The MOSCA-FREIGHT module flowed into new product developments to complement the freight related part of urban transport planning and optimisation from the public side, but also to improve the planning tools for the private side. VISEVA-W is now integrated into the overall model structure of the VISEVA model for passenger transport demand and the VISUM model for traffic assignment, helping transport planners in conducting traffic analyses for cities and optimising the overall transport system.

Impact in the CLOUD → HIGH

5.2.6   Emilia Romagna Permit Portal

Introduction

The aim of the Emilia Romagna Permit portal is to simplify and harmonise the administrative rules for city logistics at regional level in relation to the management of the permissions of freight vehicles to access the urban LTZs. This tool is able to:

- Verify permit requirements: against number plate entry, with associated costs and access/parking fees;
- Verify active permits (per vehicle, with associated expiry dates and access rights);
- Apply for new permit or Change/Renew active permit

Pathway from the project stage to its implementation

In the framework of the NOVELOG Project, the pilot carried out in the Region of Emilia Romagna had the objective to simplify and harmonise the administrative rules for city logistics at regional level in relation to the management of the permissions of freight vehicles to access the urban LTZs. This portal prototype is now going to be activated from the Region which, at the end of November 2020, approved a Memorandum of Understanding between the Region itself and the municipalities that have expressed interest in the initiative and in the implementation of the project to define the timeframe and methods for the detailed design and subsequent implementation of the web portal. The funds for the realization of the portal are already committed.

Achievements and influence on policy

Looking to a progressive harmonization and a single one-stop-shop on a regional basis, the following aspects were identified on which it was decided to work to achieve complete uniformity in all municipalities:

- **Data acquisition from external databases and self-certification**: users are asked to produce documentation certifying the possession of certain requisites, sometimes the documentation is redundant and not digitalized and this produces inefficiencies and recording errors. It is advisable to work towards the acquisition of documents from external databases (Nation public vehicle registry, Chambers of Commerce for company data) and when this is not possible (e.g. invoices attesting activity in LTZ) request self-certification, to reduce the problems mentioned above and enable software integration among different platforms, relieving databases that often present non-technological but legal problems (data processing between different bodies).
- **Dematerialization**: some municipalities allow the electronic transmission of documents and release the permit in dematerialized form (the permit does not consist of any physical support, but is an authorization linked to the user/vehicle). To complete this process technological upgrades are sometimes necessary (in particular on parking enforcement) but on the other hand, benefits can be obtained, both for the public administration and for the citizens, in terms of reduced access to the counter.

- **Online payment**: this process, often consequent to dematerialization, makes possible to complete the release procedure in a completely remote form, thus further reducing costs for both citizens and the public administration

Conditions met to success: city municipality and institutions involved

Impact area and level

Impact on Logistic operations. Regional Level.

Impact in the CLOUD → HIGH

5.2.7   Sustainable urban logistics planning topic guide

Introduction

The Sustainable urban logistics planning topic guide provides practical assistance to a city on how it should address the urban logistics aspect in the city's SUMP. It gives evidence on which parts of the SUMP process a dedicated Sustainable Urban logistics Planning process is needed. The guide is rich in benchmarks & best practices, to follow (i.e. multi-stakeholders platform mixture & governance model for UFT, Examples of Public Private Partnerships for sustainable city logistics implementation, Vision definition for industry understanding and engagement, etc) while it provides to city authorities and decision makers a detailed framework of tools, methods and techniques that can be used for improving the sustainability and effectiveness of the urban mobility system taken into account the current city logistics challenges and the city's unique typology.

Pathway from the project stage to its implementation

The Sustainable Urban logistics Planning- SULP Topic Guide was developed in the framework of the HORIZON 2020 NOVELOG project. The document was published by ELTIS[67], the Europe's main observatory on urban mobility, financed by the European Commission's Directorate General for Mobility and Transport as part of a compendium of guides and briefings that complement the SUMP Guidelines

Achievements and influence on policy

Almost three years after the completion of the Topic Guide the document constitutes the main guiding reference at European level for the development of SULP in several European cities proving its ability to cover the stakeholders needs. Apart from the research & the CIVITAS communities which recognised its validity and use it in many events (6th European Conference on Sustainable Urban Mobility Plans[68], National Conferences of CIVITAS projects, POLIS Conferences, VREF Conference in Gothenburg, etc.), the SULP topic guide is recognised as the reference city logistics document for the capacity building program of Interreg Europe Policy Learning Platform and it is used in various capacity building activities: Interreg Europe Workshop (Tackling the urban logistics challenge webinar [69]; Tackling the urban logistics challenge webinar; Framing the Urban logistics strategy workshop; SUMP Peer Review processes hosted by the City of Warsaw, Ireland, etc.). Finally, the SULPs Guidelines are still used in ongoing EU research initiatives: 1) In H2020 Fast Track project, together with NOVELOG outcomes the Topic Guide, are used as reference in the capacity building events for innovative city

---

[67] https://www.eltis.org/in-brief/about-us

[68] https://www.eltis.org/sump2019

[69] https://www.interregeurope.eu/policylearning/event/4126/webinar-tackling-the-urban-freight-logistics-challenge/?no_cache=1

logistics, 2) In the H2020 SURF project, dedicated training module was using the guide for SULP development, 3) The SULP topic guide was one of the documents communicated in the context of the EU-USA collaboration activities for city logistics (2019) and was central theme in invited speeches in relevant conferences in the USA since then.

Conditions met to success: key stakeholders involved, support from high-level institution

Impact area and level Potential for growth and replication

Impact on SULP development. Potential for implementation in other EU cities developing SULPs.

Impact in the CLOUD → VERY HIGH   ⭐⭐⭐⭐⭐

5.2.8   Conclusions for the Urban Logistics Cloud

When looking at the implementation cases included in the Urban Logistics Cloud, one can identify one common success factor, which is the collaboration between private and public stakeholders, establishing the right dialogue and alignement of challenges in the city. Cases of European projects where industry priorities were identified, supported and integrated into policy making were those that generated further developments beyond the project duration. On the other hand, the city must have a clear picture of the externalities arising from urban logisticsand steer , through policy making, the practices of operators towards increasingly sustainable models.

5.3   General conclusions

The two cloud reports present these types of implementations reaching impact, i.e. from project outcomes to:

-   Commercial products or services exploited by companies as part of their solutions portfolio to address customers (e.g. PTV)
-   Transition internal company processes and operations (e.g. UPS)
-   New start-ups and companies: CRC-Services, TRIVIZOR.
-   Transformative initiative addressing a sector or a market by NGOs/Associations: GS1, TDA
-   Implementation of new policies and transformation in cities or regional governments: Padova, Rome
-   Support European Policies implementation by stakeholders: EU topic guide on Sustainable Urban Logistics Plans

6   Conclusions and recommendations – the way forward

This report has presented, among others, an analysis of the relation of policies, company objectives and R&D project expected impacts, with a specific focus on implementation cases both in the market and policy field.

The following conclusions stem from that analysis, as well as their corresponding recommendations:

Conclusion 1. the Sustainable Development Goals are a common framework for alignment between European Union, Companies

→ Recommendation: R&I programmes are explicitly addressing Sustainable Development Goals and related KPIs, KPIs may need to be developed accordingly.

Conclusion 2. There is an important correlation between most of the Policy & Company social objectives. However, translating those objectives in concrete KPIs for R&I is not straightforward as there are too many Impact Indicators and KPIs.

→ Recommendation: Make a prioritization of most important Impact Indicators and KPIs to address particular policy and company objectives.

Conclusion 3. For the market-oriented implementation cases, the assessment of the pathway towards impact clearly validates the existence of the valley of death. Therefore, although there are causal links between the research and the impact, most of the conditions to achieve that impact were more dependent on addressing other critical aspects such as regulations, market, social, commercial and industrialization readiness of the solution.

→ Recommendation: Define different readiness levels for R&I results to be realized as actual impacts beyond TRL.

These preliminary conclusions have been reached for a concrete analysis of 11 implementation cases in the coordination and collaboration and urban logistics clouds. Future work would perform the same exercise for all the other clouds addressed by BOOSTLOG, not only to validate the above conclusions and recommendations, but also to analyse of impact at Logistics Cloud level and identify the specific framework conditions that supported the success of those implementation cases.

Moreover, the proposed recommendations above will be further detailed during BOOSTLOG lifespan, providing a detailed pathway linking EU policies, company objectives and proposed sets of KPIs. Indeed, this would result into deliverable D3.5, an updated version of the current document with the proposed identified KPIs with clear indications on how and to what extent they support both policy and company objectives.

Annex I: Expected impacts for the Coordination and Collaboration Cloud.

PROJECT / Expected impact	Decrease of environmental impact*	Reduction of congestion on the road network*	Modal shift*	Improved capacity utilisation of barge, train and truck	Decrease cost of transport & overall logistics*	Improved inventory management	Increased transport reliability and responsiveness*	Increase management capacity of terminals & productivity	Improved operations in terminals	On-time arrival rate	Improved terminal capacity utilization and efficiency	Decrease travel times*	Improve energy consumption	Increase transport efficiency*	Improve the performance of the European Transport	Improve long distance–city distribution connectivity
MOSCA																
CITYLAB	Zero-emission city logistics in urban centres by 2030, emission benefits				Cost benefits									Increased load factors and reduced vehicle movements		
NEXTRUST	X	X												Reduce the number of delivery vehicles by at least 10%. Improve truck and container load factors (+ 50% in test cases and overall stabilise load factors) and provide new 'back-load' possibilities		
NOVELOG	Zero emission city logistics in urban centres by 2030				X									Increased load factor & reduced vehicle movements	Better integration of city logistics in urban policies	
SUCCESS	Zero emission city logistics in urban centres by 2030				X									Increased load factor & reduced vehicle movements	Better integration of city logistics in urban policies	
U-TURN	Zero emission city logistics in urban centres by 2030				X									Increased load factor & reduced vehicle movements	Better integration of city logistics in urban policies	
MAIN-E																

PRODCHAIN																
EURIDICE															X	
KOMODA																
SECURE SCM																
E-FREIGHT			X													
CO3					X								X	X		
ICARGO	25% reduction in GHG emissions in transport		X												X	
MODULUSHCA	X				X											
CLUSTERS 2.0	Less emissions, carbon footprint, noise and land-use	X	X										X		Higher resilience of the transport system. Improved door-to-door logistics performance (faster, cheaper and more reliable). Increased added value of hubs, integrating manufacturing and sharing resources to create logistics clusters with a much higher impact on local economies	More efficient goods handling (30 % cost reduction)
COG-LO	Lower emissions	10% shorter delivery routes			Reduction in fuel consumption		X					X		10% higher load factors		
ICONET	30% reduction emissions	30% reduction in terms of congestion		Improved asset utilisation									30% reduction in terms of energy consumption			
LOGISTAR	X				X		Increased reliability					Reduced transit times		10% higher load factors, 10% shorter delivery routes		
TOTAL	11/11	4/10	3/5	1	8/5	0	2/2	0	0	0	0	2/2	3	8/12	6	1

* Expected impacts validated by experts in a BOOSTLOG workshop

X indicates a mention of the expected impacts in the topic call but no target value or further information

Table 7. Projects mapping of the expected impacts (from the topics) for the Coordination and Collaboration Cloud (D2.1 and experts validation).

Annex II: Expected impacts for the Urban Logistics Cloud.

PROJECT / Expected impact	Decrease of environmental impact*	Reduction of congestion on the road network*	Modal shift*	Improved capacity utilisation of barge, train and truck	Decrease cost of transport & overall logistics*	Improved inventory management	Increased transport reliability and responsiveness*	Increase management capacity of terminals & productivity	Improved operations in terminals	On-time arrival rate	Improved terminal capacity utilization and efficiency	Decrease travel times*	Improve energy consumption*	Increase transport efficiency*	Improve the performance of the European Transport	Improve long distance-city distribution connectivity*
MOSCA	x															
CITY MOVE	x															
CITYLOG																
DELIVER	x												maximised energy efficiency (40 % better than best-in-class ICE benchmark)			
CITY FREIGHT	x															
CITYLAB	Zero-emission city logistics in urban centres by 2030, emission benefits				Cost benefits									Increased load factors and reduced vehicle movements		
CIVITAS ECCENTRIC	CO2 free city logistics by 2030															
NEXTRUST	X	X												Reduce the number of delivery vehicles by at least 10%. Improve truck and container load factors (+ 50% in test cases and overall stabilise load factors) and provide new 'back-load' possibilities		
NOVELOG	Zero emission city logistics in urban centres by 2030				X									Increased load factor & reduced vehicle movements	Better integration of city logistics in urban policies	
FIDEUS																
FREVUE																
FURBOT																

INSTANT MOBILITY										
OPTICITIES	Yearly gain of 1.5 MT of CO_2									
SMARTFUSION										
STRAIGHTSOL										
SUCCESS	Zero emission city logistics in urban centres by 2030			X					Increased load factor & reduced vehicle movements	Better integration of city logistics in urban policies
U-TURN	Zero emission city logistics in urban centres by 2030			X					Increased load factor & reduced vehicle movements	Better integration of city logistics in urban policies
V-FEATHER										
VitalNodes										
EDRUL										
TOTAL	18	15	1	9	15	12	7	16		5

* Expected impacts validated by experts in a BOOSTLOG workshop

 X indicates a mention of the expected impacts in the topic call but no target value or further information

Table 8. Projects mapping of the expected impacts (from the topics) for the Urban Logistics Cloud (D2.1 and projects / implementation cases consultation).

Annex III: MARKET ANALYSIS

In order to understand the hosting market for each solution analysed in the Implementation Cases a market analysis including the main logistics markets has been performer. Among the main markets quantified:

- LOGISTICS (GLOBAL, EU and US), 4PL, 3PL, MAIN PLAYERS
- LAST MILE DELIVERY
- CARGO CONTAINER
- LOGISTICS SOFTWARE

The main values from the market analysis including the logistics, 4PL, 3PL, last mile delivery and cargo container markets as well as software for logistics application are included in the following table.

Table 9. Main values for the logistics services software market analysis.

CATEGORY	VALUE
Worth of the global logistics market size 2020	7.58 billion EUR
Global contract logistics market size2020	213,850 million EUR
Global logistics industry costs 2020	8.02 billion EUR
Global parcels market 2020	450,000 million EUR
Size of the global logistics market 2020 (logistics industry value)	**5.73 billion EUR**
North America	0.9 billion EUR
Europe	1.11 billion EUR
Global last mile delivery market	98,470 million EUR
Global shipping container market size	5,833 million EUR
Market size of 4PL logistics worldwide 2020*	53,460 million EUR
North America*	15,030 million EUR
Europe*	15,920 million EUR
Global 3PL market size (revenue) 2020	847,630 million EUR
North America	244,100 million EUR
Europe	158,660 million EUR
World´s leading 3PL provider	DHL

* Estimated value.

The main players in the current supply chain software market map are detailed below[70].

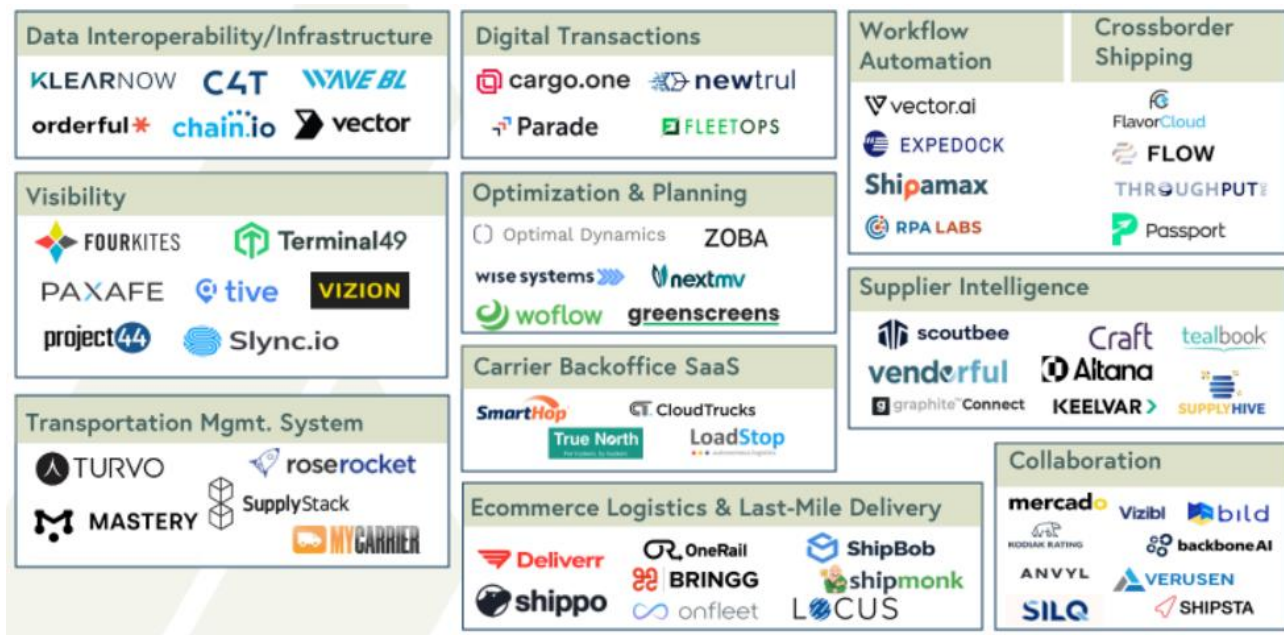[70] https://www.bvp.com/atlas/roadmap-supply-chain-software.

Figure 10.   Main players in the current supply chain software market map.

LOGISTICS MARKET (GLOBAL AND REGIONAL)

In 2020, the global logistics market was worth almost 7.58 billion euros. With roughly 3.5 billion euros in size, the logistics market in the Asia Pacific region is the largest one globally. North America was the second largest region in that year, accounting for approximately two 2.7 billion euros.

In 2020, global logistics costs amounted to 8 billion euros, a decrease from 8.47 billion euros in the previous year[71]. The global freight forwarding market was sized at around 161 billion euros and is expected to increase to 207 billion euros by 2025.

Logistics is an increasingly important activity globally, with an estimated annual industry value of **5.73 billion euros in 2020**[72]. The value has dropped since the beginning of the COVID-19 pandemic in 2020, but it is expected to rise to 6.88 billion euros by the year 2024[73]. The global logistics industry is expected to grow at a compound annual growth rate (CAGR) of 4.5 % from 2020 to 2024.

---

[71] https://www.statista.com/topics/5691/logistics-industry-worldwide/#dossierKeyfigures.

[72] Bencak, P.; Hercog, D.;Lerher, T. Indoor Positioning System Based on Bluetooth Low Energy Technology and a Nature-Inspired Optimization Algorithm. Electronics 2022, 11, 308. https://doi.org/10.3390/electronics11030308

[73] Statista. Logistics Industry—Market Size 2018–2024 https://www.statista.com/statistics/943517/logistics-industry-global-cagr/ (accessed on 20 November 2021)
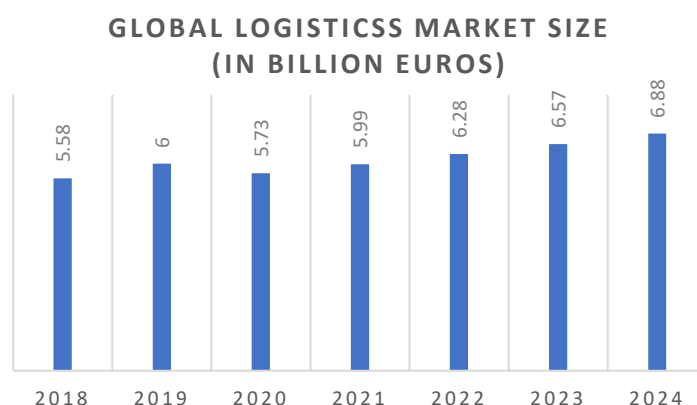
GLOBAL LOGISTICSS MARKET SIZE (IN BILLION EUROS)

Figure 11. Size of the global logistics industry from 2018 to 2024 (in billion euros) (Source: Statista. Logistics Industry—Market Size 2018–2024).

The global parcels market exceeded 450,000 million euros in value in 2020, up from just under 405,000 million euros in 2018. Asia Pacific is the largest regional parcels market by value, accounting for around 42% of the global market. North America and Europe together represent a little over 50% of the market[74].

NORTH AMERICA LOGISITCS MARKET

The North American logistics market generated just under one 0.9 billion euros in economic value during 2020. In the upcoming years, it is forecasted that this market will follow a steady growth path given the increasing interdependence between logistics and firm-level business activities in the economy.

The volume of rail freight transported within the country amounted to just over 2.1 billion tonne-kilometers. The overall total U.S. ton-miles of freight are expected to reach 7.67 billions of ton-miles by 2045[75].

Third-party logistics (3PL) is a growing industry in the United States. The total industry revenue was 204,020 million euros in 2020. By 2023, the 3PL market is expected to exceed 271,120 million euros.

CATEGORY	VALUE
Revenue of the trucking industry in the U.S.	645,380 million EUR
3PL revenue in the U.S. 2020	204,020 million EUR
3PL revenue in the U.S. 2023 (forecast)	271,120 million EUR
U.S. parcel transportation costs	104,520 million EUR

Source: Logistics industry in the U.S. by Statista.

EUROPEAN MARKET

In 2020, the size of the European logistics market was over 1.1 billion euros with a total value of industrial and logistics investments over 38 billion euros. Logistics costs in Europe amounted to more than 1.46 billion euros in 2020[76].

---

[74] Global Parcel Delivery Market Insight Report 2021 https://finance.yahoo.com/news/global-parcel-delivery-market-report-171500704.html.

[75] Logistics industry in the U.S. by Statista. https://www.statista.com/topics/1417/logistics-industry-in-the-us/#dossierKeyfigures.

[76] Logistics industry costs in Europe from 2013 to 2020 by Statista. https://www.statista.com/statistics/1221139/logistics-costs-europe/

CATEGORY	VALUE
Size of the global logistics market	5.73 billion EUR
Size of the European logistics market	1.11 billion EUR
Revenue of the European parcel market	38.000 million EUR

Source: Logistics industry costs in Europe from 2013 to 2020 by Statista.

Fourth-party logistics (4PL)

Fourth-party logistics involve the outsourcing of not only the organization of logistic tasks to third parties, but also the management.

Three different studios were found analysing the current market and trends of 4PL companies with similar values and future tendencies.

The first statistics[77] represents the size of the fourth-party logistics (4PL) market in 2018 (49,260 million euros) and 2019 (51,310 million euros) and gives a forecast through 2027. The 4PL market is expected to grow to 53,360 million euros in 2020 and around 78,600 million euros by 2027.

According to the second research study[78], the global 4PL Logistics Market was estimated at 52,530 million euros in 2019 and is expected to reach 76,930 million euros by 2026. The global 4PL Logistics Market is expected to grow at a compound annual growth rate (CAGR) of 5.5% from 2019 to 2026, with an estimated value of 55,420 million euros in 2020. Top market players are C.H Robinson Worldwide, Ltd., CEVA Logistics, Accenture Consulting, XPO Logistics, Inc. and others.

The third studio[79] revealer a value for the global 4PL services market at 51,460 million euros in 2019 and is projected to reach 53,770 in 2020 and 71,970 million euros by 2027. The market will grow at a CAGR of 4.5% during the forecast period 2020-2027. Top 4PL Services suppliers are: DHL Supply Chain & Global Forwarding, Kuehne + Nagel, DB Schenker Logistics, Nippon Express.

The **North America** fourth party logistics market accounted for 13,840 million euros in 2018 and is expected to grow at a CAGR of 4.1% over the forecast period 2019-2027, to account for 15,000 million euros in 2020 and 19,630 million euros in 2027[80].

The **Europe** fourth party logistics market accounted for 14,520 million euros in 2018 and is expected to grow at a CAGR of 4.6% over the forecast period 2019-2027, to account for 15,890 million euros in 2020 and 21,680 million euros in 2027[81].

---

[77] Market size of 4PL logistics worldwide 2018-2027 by Statista. https://www.statista.com/statistics/992952/fourth-party-logistics-market-size-worldwide/.

[78] Synergy Plus Operating Model, Solution Integrator Model and Industry Innovator Model): Global al Surveys, Comprehensive Analysis, Historical Developments, Current Trends, and Forecasts, 2020–2026. https://www.globenewswire.com/news-release/2021/01/05/2153276/0/en/At-5-6-CAGR-Global-4PL-Logistics-Market-Size-Will-Reach-USD-84-43-Billion-by-2026-Facts-Factors.html

[79] 4PL Services Market, Supplier, Risk and Competitive Intelligence, BEROE. https://www.beroeinc.com/category-intelligence/4pl-services-market/.

[80] https://www.reportlinker.com/p05783141/North-America-Fourth-Party-Logistics-Market-to-Regional-Analysis-and-Forecasts-by-Type-and-End-User.html?utm_source=PRN.

[81] https://www.reportlinker.com/p05783121/Europe-Fourth-Party-Logistics-Market-to-Regional-Analysis-and-Forecasts-by-Type-and-End-User.html?utm_source=GNW.

Third-party logistics (3PL)

Third-party logistics (3PL) refers to the outsourcing of the logistics operations of a firm for either distribution, warehousing, or fulfillment services. Compared to integrated logistics, 3PL has several desirable characteristics for a firm to use, such as cost and time savings, low capital commitment, focus on the firm's operation and flexibility. In general, 3PL is a logistics service that enables industrial organizations to access the larger service network of global supply chain logistic providers.

Participants in the 3PL market generate an economic value that amounts to over 847,000 million euros in 2020, in less than a decade, the 3PL market expanded by roughly 29%[82]. The Asia Pacific 3PL market is the largest one worldwide in a regional comparison, which made over 354,000 million euros. Followed by the USA with a market of 243,660 million euros and Europe with a market of 158,370 million euros. The leading 3PL provider based on gross logistics revenue was DHL.

According to a different report[83], the global third party logistics market is projected to grow from 889,530 million euros in 2021 to 1,55 billion euros in 2028 at a CAGR of 8.26% during the 2021-2028 period. The global impact of COVID-19 pandemic has been unprecedented and staggering, with witnessing a negative demand shock across all regions amid the pandemic. Based on an analysis, the global market exhibited a growth of 1.5% in 2021. The slow growth in CAGR is attributable to this market's demand and growth, returning to pre-pandemic levels once the pandemic is over.

Main 3PL players

In 2020, DHL Supply Chain & Global Forwarding, Kuehne + Nagel, DB Schenker were the three leading 3PL providers globally based on gross logistics revenue[84]. For instance, DB Schenker generated approximately 19,000 million euros in 2020.

Deutsche Post DHL is the world's largest postal service, generating 66,800 million euros in 2020 the company's total assets stood at around 55,300 million euros[85]. Headquartered in Bonn, they operate in over 220 countries and have over 571,900 employees operating in the following segments: Post-eCommerce-Parcel, DHL Express, DHL Supply Chain and DHL Global Forwarding / Freight. In 2020, the revenue from the express post sector amounted to 19,100 million euros.

Deutsche Post DHL delivers around 49 million letters and 5.9 million parcels every day in Germany alone. The company generated approximately 19,800 million euros in 2020 in the region, making it the region that brought in the highest amount of revenue. In 2020, Deutsche Post's network in Germany included around 82 mail centers, 36 parcel centers and 109,500 post boxes.

Not only does Deutsche Post DHL have a significant presence inside of Germany, they also operate a lot of activities worldwide. As of 2018, Deutsche Post DHL had 39% of the international parcel market, the largest globally. Furthermore, they are also the leading airfreight forwarder worldwide; in 2019, their Supply Chain

---

[82] (Statistics & facts by Statista. https://www.statista.com/topics/7122/third-party-logistics-3pl-industry-worldwide/.

[83] https://www.fortunebusinessinsights.com/third-party-logistics-market-105802

[84] https://www.lloydsloadinglist.com/freight-directory/news/DHL-tops-3PL-rankings-again/72119.htm#.Yk764chBxPY.

[85] https://www.statista.com/statistics/316330/revenue-of-deutsche-post-dhl/#:~:text=Deutsche%20Post%20DHL%20is%20the,and%20have%20over%20571%2C900%20employees.&text=Deutsche%20Post%20DHL%20delivers%20around,every%20day%20in%20Germany%20alone.

and Global Forwarding segment transported over two million metric tons of airfreight. They also came in third in ocean freight forwarding, with over 3.2 million twenty-foot equivalents of ocean freight. Additionally, they are the leading third-party logistics (3PL) provider in the world.

In 2020, the **European third-party logistics market** generated revenue to the value of 158,400 million euros[86]. The third-party logistics market in Europe is poised to grow by 48,300 million euros during 2021-2025, progressing at a CAGR of almost 5% during the forecast period[87].

The European logistics market was dominated by the top ten global logistics companies like Deutsche Post, Maersk, and Kuehne + Nagel, which had a combined revenue worth 74,400 million euros in 2020. Germany had the largest market for 3PL services in Europe in 2020, generating roughly 29,500 million euros in revenue.

Third-party logistics (3PL) is a growing industry in the **United States**. There has been a year-on-year increase in revenue every year besides 2019, when the total industry revenue dropped to 193,900 million euros. The revenue of the 3PL market in the United states was 244,100 million euros in 2020. By 2023, the 3PL market is expected to exceed 270,630 million euros[88].

LAST MILE DELIVERY

By 2027, the global last mile delivery market is expected to grow to more than 182,630 million euros from 98,500 million euros in 2020, growing at a CAGR of 9.29% from 2021 to 2027. The growth of the last mile delivery market is led by the increased number in online orders and other driving factors[89][90].
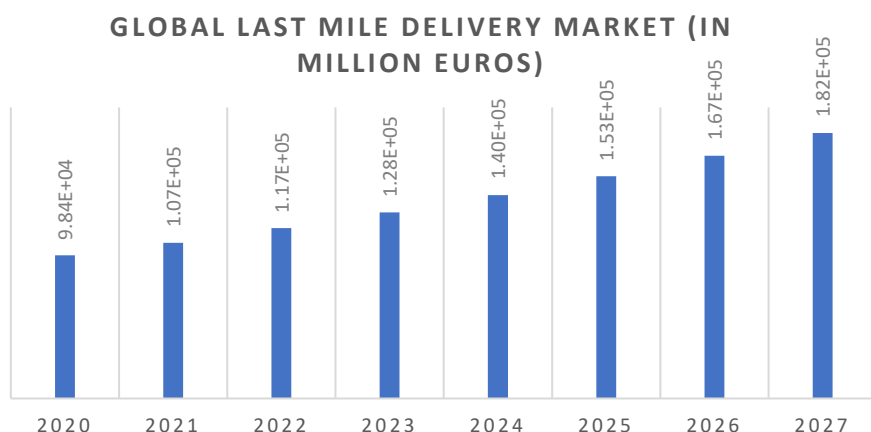

Figure 12. Size of the global last mile delivery market from 2020 to 2027 (Source: Statista).

---

[86] https://www.statista.com/statistics/286379/europe-3pl-revenue/.

[87] Third-Party Logistics Market in Europe 2021-2025. https://www.reportlinker.com/p04539060/Third-Party-Logistics-Market-in-Europe.html

[88] Size of the global last mile delivery market from 2020 to 2027. https://www.statista.com/statistics/638368/us-third-party-logistics-market/

[89] Size of the global last mile delivery market from 2020 to 2027(in billion U.S. dollars) https://www.statista.com/statistics/1286612/last-mile-delivery-market-size-worldwide/.

[90] LONDON, Sept. 29, 2021 /PRNewswire/ https://www.prnewswire.com/news-releases/at-9-29-cagr-last-mile-delivery-market-size-is-expected-to-reach-usd-200-42-bn-in-2027--says-brandessence-market-research-301387705.html.

The main global indicators for last mile delivery accounted to 25,000 million parcels distributed worldwide with a delivery time of 12 minutes and an average cost of 5.83 euro per parcel[91].

CATEGORY	VALUE
Number of parcels distributed worlwide	25,000 million
B2B parcel delivery cost	5.83 euros per cbm
Delivery time of a parcel during the day	0.2 h per cbm

Source: STATISTA Last-mile logistics worldwide - Statistics & Facts.

According to Valuates Reports[92] the global Last Mile Delivery market size is projected to reach 62,127 million euros by 2027, from 32,320 million euros in 2020, at a Compound Annual Growth Rate (CAGR) of 9.9% during 2021-2027. Major factors driving the growth of the Last Mile delivery market size, integration of advanced technologies into existing systems, rise in the consumers' demand for just-in-time delivery, Increase in internet penetration, and expansion of the e-commerce industry.

European last mile delivery market

Europe last mile delivery market accounted for 608 million euros in 2018 and is expected to grow at a CAGR of 16.1% over the forecast period 2019-2027, to account for 2270,6 million euros in 2027[93].

In 2020, the European parcel market generated revenue to the value of over 53,120 million euros. This is an increase of around eight million euros from the year before. The parcel market is generally defined as including the delivery of packages up to around 40 kilograms, although this can vary slightly between countries. Deliveries of items other than packages, such as mail and documents, or larger items such as freight, are excluded. Also excluded are same day courier services, although express delivery services are included. In 2018, the global parcel delivery market was valued at just over 279,000 million euros (including same-day couriers). At that time, DHL was the largest provider in both Europe and the Asia-Pacific region[94].

The **European parcels market** exceeded 80,000 million in 2020, having grown briskly in recent years as economic performance across the continent has improved and growth of home shopping has continued. All of the leading countries have seen grown at over 5% CAGR[95].

Regional market

The domestic parcel traffic in Europe per region is detailed in *Figure 13*.

In 2021, Germany was the largest European market in autonomous last mile deliveries, with a market size worth 22.32 million euros. The second largest market was the United Kingdom, with a market size of 17,77 million euros[96].

---

[91] STATISTA Last-mile logistics worldwide - Statistics & Facts. https://www.statista.com/topics/4383/last-mile-delivery/#topicHeader__wrapper.

[92] https://reports.valuates.com/market-reports/QYRE-Auto-22T543/global-last-mile-delivery.

[93] Reportlinker.com announces the release of the report "Europe Last Mile Delivery Market to 2027 - Regional Analysis and Forecasts By Offerings: Technology ; Type ; Application" - https://www.reportlinker.com/p05806316/?utm_source=GNW.

[94] https://www.statista.com/statistics/235412/b2c-market-share-of-parcel-services-in-europe/.

[95] (https://apex-insight.com/product/european-parcels-market-insight-report-2021/.

[96] https://www.statista.com/statistics/1286825/autonomous-last-mile-delivery-market-size-europe-country/.

In 2020, German postal services delivered over 3.8 billion parcels across the country, making it the leading one in Europe. During that period, European postal services delivered approximately 33.3 billions domestic letters in total[97].

French market

The 'last mile' delivery market in France is forecast to expand at a CAGR2018-2025 of 9%[98]. In 2020, according to Effigy Consulting, over 1.5 billion parcels were delivered in the courier, express, and parcel (CEP) market in France[99].

As the domestic parcel traffic in Europe reached roughly 6.5 billion parcels handled in 2019, up from approximately 4.2 billion parcels in 2012, the number of packages distributed in France has increased to more than 1.2 billion items. The largest parcel delivery group operating under LaPoste, Colissimo, its most popular sub-company, had reached a delivery amount of 471 million parcels and a record revenue of 12,000 million euros in 2020[100].
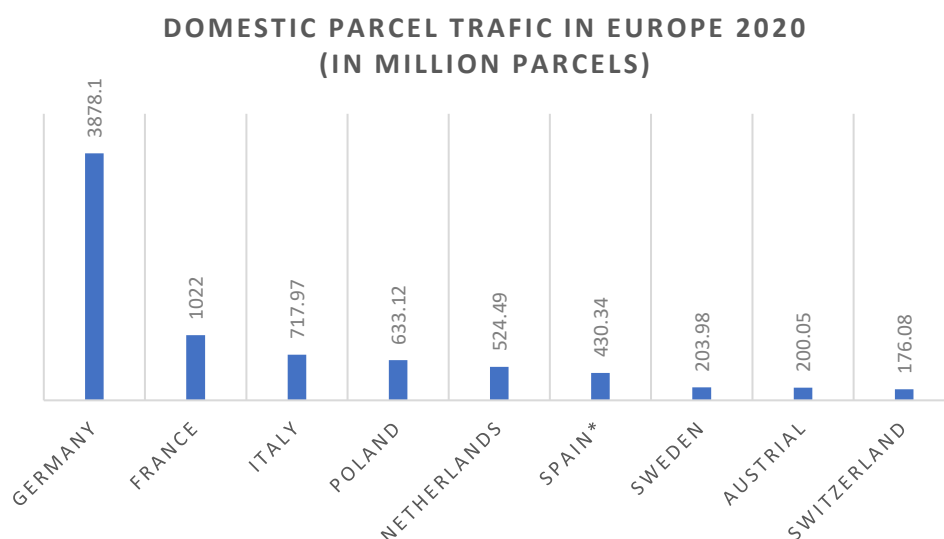
DOMESTIC PARCEL TRAFIC IN EUROPE 2020 (IN MILLION PARCELS)

Country	Million parcels
GERMANY	3878.1
FRANCE	1022
ITALY	717.97
POLAND	633.12
NETHERLANDS	524.49
SPAIN*	430.34
SWEDEN	203.98
AUSTRIAL	200.05
SWITZERLAND	176.08

Figure 13. Domestic parcel traffic in Europe in 2020 (Source: Statista).

GLOBAL SHIPPING CONTAINER MARKET

The **global shipping container market** size was valued at 5,833 million euros in 2020[101] and is expected to expand at a compound annual growth rate (CAGR) between 4.3% and 12.0% from 2021 to 2027[102].

---

[97] https://www.statista.com/statistics/1142551/domestic-parcel-traffic-europe-country/.

[98] https://capitalmind.com/attractive-growth-in-the-last-mile-delivery-market/.

[99] https://www.statista.com/statistics/1200870/courier-express-parcel-market-volume-france/.

[100] https://www.statista.com/topics/7883/e-commerce-shipping-in-france/#topicHeader__wrapper.

[101] https://www.grandviewresearch.com/industry-analysis/shipping-container-market-report.

[102] https://www.alliedmarketresearch.com/shipping-containers-market - https://www.mordorintelligence.com/industry-reports/global-container-shipping-market.

The market is expected to be driven by maritime trade, expanding penetration of the e-commerce industry, digitization in shipping container space, and increasing demand for specialized shipping containers by the department of defense.

20' and 40' are the most popular sizes of shipping containers as of 2021. Although based on application shipping containers are often manufactured in a variety of sizes such as 8', 10', 48', 53', and others. Their increasing demand for transportation of a variety of goods such as food, pharmaceutical, automotive components, and agricultural products is expected to support industry growth.

The significant developments in commercial vessels and innovation of efficient and better cargo ships equipped with advanced technology such as navigation systems, advanced sensors, and other components are accelerating the demand for cargo transportation through ships, which is further fueling the growth of the market.

LOGISTICS SERVICES SOFTWARE MARKET

The **logistics services software market size** was 304.8 million euros in 2019 according to the report from Technavio 2019[103], with an estimated value of 315.31 million euros in 2020, and is expected to grow at a CAGR of 4.47 (between 2019 and 2024) to reach a market size of 378.3 million euros in 2024 (incremental value of 74.28 million euros). The top key countries regarding their contribution to the total market in 2019 are Germany with a contribution of 10.5-11.25% and France with a contribution of 5.2-5.56%.

The latest report from Technavio (2020) [104] indicates that the **logistics services software market** has the potential to grow by 2,657 million euros during 2021-2025 (35% of the growth originated in North America), and the market's growth momentum will accelerate at a CAGR of 10.40%. North America led the market in 2019, followed by Europe, APAC, MEA, and South America, respectively, due to the high adoption TMS software and WMS software.

According to a comprehensive research report by Market Research Future (MRFR)[105] on **Logistic Software Market**, the size of the market will reach 16,662 million euros, growing at a compound annual growth rate of 10.5% by 2030.

Firms have invested 25,480 million euros in logistics startups, with nearly all of these investments happening since 2015, and digital brokerage platforms are expected to grow 30 times over the next 10 years[106].

More specifically within the logistics software market:

The **global supply chain management software market** stood at a value of around 12,986 million euros in 2020 according to Expertmarketresearch[107]. The market is further expected to grow at a CAGR of 15.4% in the forecast period of 2022-2027 to attain a value of 30,585 million euros by 2026.

---

[103] https://www.technavio.com/report/logistics-services-software-market-industry-analysis?utm_source=pressrelease&utm_medium=bw&utm_campaign=T25_wk48&utm_content=IRTNTR40172.

[104] https://www.technavio.com/report/logistics-services-software-market-industry-analysis.

[105] https://www.globenewswire.com/news-release/2022/01/31/2375497/0/en/Logistic-Software-Market-will-Touch-USD-18-31-Billion-at-an-10-5-CAGR-by-2030-Report-by-Market-Research-Future-MRFR.html

[106] https://www.sdcexec.com/software-technology/ai-ar/article/21378605/web-integrated-network-win-where-logistics-companies-can-invest-to-improve-the-industry-glenn

[107] *https://www.expertmarketresearch.com/reports/supply-chain-management-software-market.*

Transportation management system (TMS) market

A transportation management system (TMS) is a subset of supply chain management and is centered mainly on transportation and logistics. The increasing use of cloud computing technologies for managing supply chain activities is one of the major trends prevailing in the transportation management systems market. Cloud-based deployments generally need less customization and configuration. These two factors are driving down lifecycle costs, making web-based applications more attractive and appealing to shippers. Retailers across the globe have realized the importance of technology for achieving real-time visibility of operations to track products as they leave manufacturing facility and move through the supply chain. Thus, retailers are gradually moving away from platform-based solutions and are switching to cloud-based technologies. Cloud technologies enable retailers to process huge customer data faster, better match customer demand with a sales season, and offer personalized solutions. Thus, cloud technologies enable mass customization, which is of growing interest to both manufacturers and retailers.

The increasing preference for SaaS based TMS solutions is the major factor driving sales growth in the TMS market. Furthermore, the need to replace and update the existing and conventional transportation management systems is expected to support the demand for advanced transportation management solutions. However, lack of awareness among end-users coupled with high deployment cost is the major inhibitor to the growth of the market. Nevertheless, the integration of cloud computing and Radio Frequency Identification (RFID) technologies with supply chain management systems will offer healthy opportunities for the growth of TMS Market over the forecast period.

The global market for transportation management systems stood at 8,726 million euros in 2016[108]. Rising at a healthy CAGR of 13.6% from 2017 to 2025, the opportunity in this market is likely to touch 27,300 million euros by the end of 2025, according to the research firm Transparency Market Research (TMR). The main drivers are the rise of mobile computing platforms, intermodal transportation, and cloud-based solutions.

The top end-use application for TMS software was for the dedicated transportation and logistics segment, which generated 67.5% of revenue in 2016 and finished above vertical applications in electrical and electronics, industrial, food and beverage, and retail sectors, according to the report, titled by Transparengymarktresearch[109].

Some other different reports were found for the **global transportation management system market - TMS** (Transportation management system (TMS) is a platform designed to streamline the transportation process, a subpart of the supply chain):

According to Alliedmarketresearch[110], the **global TMS market** was valued at 4,975 million euros in 2019, and is projected to reach 10,344 million euros by 2027, registering a CAGR of 9.6% from 2020 to 2027.

Marketsandmarkets[111] reported that the **global TMS market** size is expected to grow from 7,007 million euros in 2020 to 16,198 million euros by 2025, at a Compound Annual Growth Rate (CAGR) of 18.2% the forecast

---

[108] https://www.dcvelocity.com/articles/28852-tms-market-to-reach-30-billion-by-2025-report-says

[109] https://www.transparencymarketresearch.com/transportation-management-system-market-2017-2025.html

[110] https://www.alliedmarketresearch.com/transportation-management-market-A06268#:~:text=The%20global%20transportation%20management%20system,subpart%20of%20the%20supply%20chain.

[111] https://www.marketsandmarkets.com/Market-Reports/transportation-management-market-232446179.html.

period. The major factors driving the growth of the TMS industry include Technological advancements in the transportation and logistics industry and exponential growth in the eCommerce industry.

Industryarc[112] valued the **global TMS market** at 8,099 million euros in 2020, and it is estimated to grow at a CAGR of 17.6% during 2021-2026.

An insight from Mordorintelligence[113] reported and expected CAGR for the **global TMS market** of over 10.85% during the forecast period (2021- 2026). According to a global survey by Smeal College of Business at Pennsylvania State University, 38 % of shippers and 67 % of 3PLs stated that they were investing in a transportation management system in 2018.

The **global TMS market** size was valued at 7,990 million euros in 2020 according to a report by Grand View Research, Inc.[114] and is expected to expand at a compound annual growth rate (CAGR) of 14.3% from 2021 to 2028. The global TMS market size is expected to reach 25,007 million euros by 2028.

An **outlook to the TMS market** by Fact. MR[115] provided the following insights:

- The transportation management system market reached a valuation of 5,369 million euros in 2021; however; worldwide revenues was down -3.2% year-over-year owing to stalled transportation for a considerable time amid COVID-19.
- The global transportation management system market is expected to accumulate a market value of 6,279 million euros in 2022.
- Demand for transportation management systems is projected to surge at a CAGR of 10.7% over the coming 10 years.
- Fact.MR estimates that transportation management system revenue will grow 2.8X from 2022 to 2032, reaching nearly 17,381 million euros by 2032.
- Transportation management solution revenue will account for over 65% share, owing to increasing adoption of advanced transportation management across emerging countries.
- Roadways command over 40% of transportation management system revenue; however, revenue from maritime is expected to grow at a significant pace.
- Among the verticals, manufacturing and transportation & logistics are expected to account for over 50% of market revenue by 2032.
- Top 5 providers of transportation management systems held around 17% market share in 2021.
- **Multimodal domestic transportation management systems (TMSs)** are a subset of the global TMS market. Gartner's report[116] focusses on holistic multimodal domestic TMSs for use by shippers (such as manufacturers, retailers, distributors and wholesalers) or non-asset-based, third-party logistics (3PL) organizations. The latest Gartner forecast on TMS, worldwide, estimates that the market is expected to grow from 1,201 million euros to 1,920 million euros (from 2019 through 2024). That is a growth of 60% over a five-year period. Factors such as the need to reduce costs; improve internal

---

[112] https://www.industryarc.com/Research/Transportation-Management-System-Market-Research-500516.

[113] https://www.mordorintelligence.com/industry-reports/transportation-management-system-market.

[114] https://www.grandviewresearch.com/industry-analysis/transportation-management-systems-market.

[115] https://www.factmr.com/report/transportation-management-system-market.

[116] See Gartner's Model for Holistic Multimodal Transportation Management Systems — Part 1: Core Capabilities and Gartner's Model for Holistic Multimodal Transportation Systems — Part 2: Extended Capabilities

productivity, efficiency and customer service; increase visibility; and make better use of capacity are driving the growth of the market through 2024.

- The Americas region will continue to lead the global TMS market in volume of implementations, followed by EMEA and then Asia/Pacific (APAC). By 2024, spend on TMS applications will be 1,920 million euros, accounting for 28.1% of the 6,625 million euros supply chain execution (SCE) software spend through 2024. This growth will be driven by the replacement of on-premises software with SaaS applications. The share of SaaS is estimated to increase from 37% through 2019, to more than 60% through 2024.[1]

The **global last-mile delivery software market** analysed by Verifiedmarketresearch[117] was valued at 4,896 million euros in 2018 and is projected to reach 9,810 million euros by 2026, growing at a CAGR of 9.28% from 2019 to 2026. The estimated market size in 2020 is 6,186 million euros.

Precisionbusinessinsigts[118] provided similar values for the **last-mile delivery software market** size with a value of 5,842 million euros in 2021 and expected to reach 10,884 million euros by 2028, at a CAGR of 9.3% during the forecast period 2022-2028.

The following table compiles the main values for the logistics services software market size.

Table 10. Main values for the logistics services software market analysis.

CATEGORY	Reference	VALUE
Logistics services software market size 2020*	Technavio 2019	315.31 million EUR
North America		20.15% - 76.05 million EUR
Europe		7.09% - 22.36 million EUR
Germany		10.5-11.25%
France		5.20-5.56%
Logistics services software market size 2020*	Technavio 2020	4,150 million EUR
Leaders in 2019		1st North America / 2nd Europe
Supply chain management software market 2020	Expert Market Research	12,986 million EUR
Global transportation management system market (TMS) 2019	alliedmarketresearch	4,975 million EUR
Global TMS market 2020	Marketsandmarkets	7,007 million EUR
Global TMS market 2020	Industryarc	8,099 million EUR
TMS 2019	Gartner	1,201 million EUR
Global transportation management systems market size 2020	Grandviewresearch	7,990 million EUR
Transportation management system market 2021	factmr	5,369 million EUR
Investment in TMS in 2018		38 % of shippers and 67% of 3PLs
Global last-mile delivery software market 2021	precisionbusinessinsight	5,842 million EUR
*Global last-mile delivery software market 2020***	verifiedmarketresearch	6,186 million EUR

* Estimated value.