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Horizon 2020

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Automated operations in logistics nodes

Expected Outcomes

1. Ports and inland terminals are intelligent hubs that manage goods and flows in an extremely efficient way so transport services and modes are smartly used and combined and fleets and assets are shared and used to the max.
2. Companies and other organizations including authorities operating in the nodes are interconnected and are able to offer and share services and capabilities digitally so smart transport offering can be created and operative and transport routing decisions are taken based on real-time traffic

information and forecasting for all modes as well as Load Units tracking. Train and barge compositions benefit for this interconnected ecosystem.

3. Logistics nodes operate in a more efficient way thanks to automation, Artificial Intelligence, enhanced interoperability of transport loading units used in different transport modes, interfaces, transhipment and crossdocking technologies development and standardization so i) the throughput of the nodes can be expanded without expanding the physical facilities, ii) transport modes are seamlessly interconnected reducing transhipment cost boosting intermodal end-to-end transport.
4. Services provided within logistics nodes are visible and seamlessly accessible by end users. Different services (transport, modular units, energy sources, transhipment, etc.) are defined in a more standardized way by the operating companies and can be booked online.
5. Transport data is secure and private when it is needed but transparent and available whenever possible enabling usage for analyses and research and development.

Challenges

The rising demand for higher levels of efficiency in transport and supply chain management requires further standardization of crossdocking and transhipment processes as described in the roadmap towards the Physical Internet.

The development of new technologies such as automated and automated and autonomous systems, Machine Learning and Artificial Intelligence, Big Data, and other emerging and cutting-edge technologies is not fully embraced through innovative logistics nodes operations and services.

Our existing physical and digital systems, processes, procedures, and information flows are too rigid, complex and fragmented to enable seamless co-modality and synchromodality facilitated in the logistics nodes. Advancing to full automation of the nodes/terminal processes and procedures will enhance the way transport modes are used and combined. Especially, for railroad terminals it is urgent to upgrade the level of the services offered, by pursuing automation strategies and following the port terminals' examples.

Idle warehouse and terminal services could be accessed through online services to maximise their utilization. In this direction, the focus points are i) the improvement of the services' visibility and ii) implementation of solutions enabling the accessibility and usability of the services in an automated/ digital manner, starting from terminal services booking. One challenge is how to open currently siloed data sources within logistics nodes so that heterogeneous transport data can be combined and applied in useful applications in logistics nodes ecosystems.

Scope

1. Building on projects such as Clusters2.0, AEROFLEX and Less than Wagon Load, further develop standardization strategies in regards of intermodal transport modular loading units, cargo transport/transhipment procedures and interfaces to enable flexibility, efficiency and sustainability

of the transport system. International cooperation (e.g. with Japan, China and US) on standardisation of sub-containers.

2. Address operational, economic and inter-organizational barriers preventing the achievement of increased efficiencies of nodes benefiting from state of the art technologies (e.g. allowing full visibility of the status of cargo through track and trace of the transport and loading units arriving to and departing from the node, etc.). Development of decision-making and management tools and solutions addressing managerial aspects (beyond technical barriers) for improved resources and capabilities of the nodes mamangement to accomodate transport demand to the available capacity in an agile way to reach higher troughputs out of the infrastructure and available services.
3. Testing and demonstration of solutions for full visibility, accessibility and usability of node services in an automated/ digital manner. Define standard services that are offered openly by logistics nodes and companies operating within them e.g. open and shared warehouses, terminal services, transport services from and to the terminals.
4. Leverage automation capabilities, artificial intelligence, data spaces and digital twins for increased productivity and efficiency of terminals and hubs including automated decision support. Develop a conceptual architecture that maps potentially relevant and complementary data sources and describes how these data can be combined as to create value-added services in logistics nodes. Research and demonstration of node operation automation in use cases (ports, inland terminals, hubs, etc.).
5. Companies operating within the nodes, including SMEs, shall develop and implement collaboration strategies so transport services from and to the nodes are smartly used and combined and fleets and assets are shared and used to the max. Develop and test new business models supporting autonomous interactions and provision of open logistics nodal services. .
6. Based on the concrete proposed concepts and new business models, identify concrete legal barriers and regulations at european and member state levels preventing adoption and market take up. In particular legal analysis identifying appropriate models for contractual relations in collaborative environments (capitalising on H2020 projects ICONET, Nextrust and Logistar).

Expected Impacts

Projects will demonstrate energy and emissions reduction targets greater than 20 % based on the operative gains without the need to renew the assets and with potential economically sound pathways for take-up beyond the project duration. Impacts are expected on:

- Fleets and Assets are shared and used to the maximum
- Transport modes are smartly used and combined.
- Integrated management of traffic and logistics advancing towards a truly integrated transport system.
- Investments in infrastructure are reduced thanks to enhanced operations.

- Increased standardization and digitalization of logistics nodes.

Projects will also contribute to EU policy objective *A Europe fit for the Digital Age* by providing seamless, smart, safe, accessible and inclusive goods mobility systems to reap the benefits of digitalisation, increase efficiency and European competitiveness and to enable better and sustainable door-to-door goods mobility.

Building supply chain and European logistics network resilience

Expected Outcomes

1. An adaptive multimodal European freight transport and logistics network that reacts quickly and seamlessly to disruptions, hence minimizing negative impacts.
2. Building a truly integrated transport system and network approach based on corridors and transport legs that can be seamlessly used and operated[1].
3. European transport and logistics networks are resilient by design and operational models thanks to better operational interconnectivity of the stakeholders, the services provided on top of the infrastructure, pre-defined alternative routes and synchromodal approaches.

Challenges

European transport and logistics networks as part of global supply chains form the backbone of the European economy and the economic growth is facing two unprecedented challenges: (i) The zero emissions target and (ii) the need of resilient multimodal transport and logistics system able to face new climate and other disruptive events (e.g. fukushima, volcanos, climate extreme weather, COVID-19).

New production and distribution trends such as lean manufacturing, industry 4.0 and just-in-time inventory, have introduced new kinds of supply chain risk and reduced the margin for error in transport. The European economy relies on an effective European transport network that responds seamlessly to traffic incidents, infrastructural disruptions, geopolitical changes, and other external factors like climate change and recently the effects of COVID-19. The impact of traffic disturbances on logistics and manufacturing operations is significant, and smart freight traffic management, embracing synchromodal approaches, can have major economic benefits.

As an example, the Rastatt incident that paralysed rail freight traffic during a seven-week interruption of railway operations on the Karlsruhe-Basel line of the Rhine-Alpine Corridor has resulted in economic damage of more than two billion Euros for the industry[2] as it was not possible to provide competitive transport alternatives to move the goods resulting in medium term reverse modal shifts.

[1] A Truly Integrated Transport System for Sustainable and Efficient Logistics (http://www.etp-logistics.eu/?p=1298)
[2] https://www.railfreight.com/corridors/2018/04/22/economic-damage-of-rastatt-incident-2-2-billion-euros/

Whilst transport infrastructure is designed to be as resilient as possible, little effort has been made in approaching this problem from a systemic approach engaging the transport services provided on top of the infrastructure. This urges for new transport service design and operation concepts and approaches to handle and manage disruptions minimizing negative impact.

There are some barriers preventing the use and creation of a seamless transport and logistics networks: The complexity of the sector (a complex grid of public and private actors that go from huge global players to very small local companies and individuals, living together in a very competitive environment) and the sector´s initial reluctance to change the current processes and business models. Moreover, while unimodal visibility is improving (mainly road), and global shipping visibility is improving (e.g. new platforms), hinterland intermodal visibility in Europe is still a black spot.

Scope

A truly integrated transport system that can handle infrastructure disruptions and minimize negative impacts is strongly linked with the synchromodal and Physical Internet concepts based on a flexible approach to transport and logistics. New and disruptive industry 4.0 technologies can enable achieving this objective. However, their potential is often limited by the reluctance to change, the need of new business models and some behavioral aspects that limit their actual potential.

Most recent research and innovation projects focus on the technological solutions, however, in order to remove the previously mentioned barriers, specific research is required to understand the motivations and incentives behind each of the involved actors and to propose new business models able to be adopted by the sector in the short-medium time and the required business/regulatory roadmaps to adopt those solutions or approaches.

Stakeholders at the supply chain level (e.g. manufacturers, retailers, freight forwarders and logistics service providers) the transport service level (e.g. transport operators) and the infrastructure network level (e.g. public road / rail / IWW authorities, transport node authorities need to be brought together to:

- The development of an integrated and very flexible transport system that contributes to face climate change and other disruptions generated by infrastructures failures and increase the resiliency of the transport network facilitating the smart use and combination of transport modes.
- Evaluate the resilience of specific logistics networks and suggest management systems and operations to increase their resilience against natural and human triggered disruptive events including alternative networks and transport services that could increase the resiliency of the full transport network.
- Develop and demonstrate how synchromodal approaches (shipment split and merge, dynamic synchronization of multimodal schedules, anticipatory shipping, realignment in case of disruptions etc.) provide resilience by design to the transport and logistics networks in which these services operate.

- Develop business intelligence capabilities, such as intermodal freight corridor performance and resilient measurement and assessment (e.g. evaluate what could be the alternative logistics networks and services to manage a failure in a main infrastructure in a transport corridor).
- Development and alignment of innovative technologies supporting different processes along the freight transport and logistics network, including decision-making system, planning, track and trace, identification of loading units as well as safety and security.
- Define and develop new business models able to be adopted by the sector in the short-medium time and the required business/regulatory roadmaps to adopt those solutions or approaches that may provide the logistics network with enhanced capability to manage disruptions.

Expected Impacts

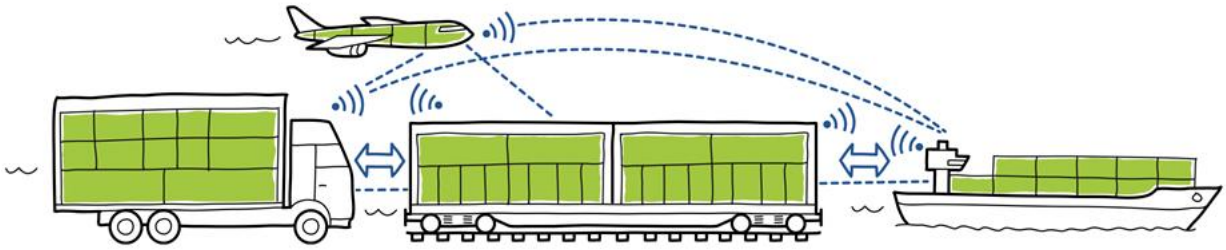
- Accelerate the creation of a smart and sustainable synchromodal freight transport networks on top of TEN-T infrastructure hence increasing the resilience of supply chains and minimising negative effects created by damage to transport infrastructure and other events disrupting freight transport and logistics chains.
- Develop the framework conditions including guiding principles and operative procedures for a European freight transport and logistics network that is transparent and robust providing transport corridor managers and users (ports/terminals, Transport Management Systems and individual LSPs) with visibility and performance tools supporting decision making for planning and during execution.
- Minimizing impacts of disruptions on European industry, maintaining and improving welfare and protection of European citizens
- Optimization of the utilization of network, assets and resources (available infrastructure, services, equipment, human resources, etc.)

Driving supply chain and logistics decarbonisation: from closed logistics networks to a system of logistics networks building the Physical Internet

Expected Outcomes

The transport system is used in a very effective and efficient way, transport modes are smartly used and combined favouring the utilization of less carbon intensive transport modes and fleets and assets are shared and used to the max.

This increased efficiency facilitates the required transition towards greener assets and vehicles thanks to the increased productivity of new logistics concepts and solutions.



Freight transport and logistics companies evolve to operate as digital platforms seamlessly engaging with partners and customers in an effective way, achieving a better utilization of the transport modes and other resources in the freight transport and logistics chain.

Challenges

Freight transport carbon emissions are still increasing, in contrast to most other sectors. Moreover, global transport demand is estimated to triple by 2050, which would mean doubling carbon emissions under a business as usual scenario. It is imperative to reduce emissions in the shorter term to deliver a 50 to 55% emissions reduction by 2030. Logistics and supply chain stakeholders are embracing European ambition to be the first climate neutral continent by 2050 and are reviewing 2030 sustainability objectives to meet COP21 objectives. More than 680 companies have committed to science-based targets, with some pledging to reach zero emissions by 2050.

Transport users are moving fast and reviewing the climate objectives and taking actions to reduce emissions. This will have an impact on transport. However, the availability of vehicles/vessels, the investment for fleet renewal and the pace at which energy is transitioning to be renewable is forecasted to be too slow to deliver the objectives for 2030.

Additional focus is required to other innovative concepts and solutions for freight transport and logistics decarbonization that aim to do more with less in a context with high constraints for costly (new) infrastructure investment and also to make affordable the transition to greener assets.

Today cargo owners, manufacturers, retailers, shippers and logistics service providers mostly use closed networks to ship products around the corner or across the globe. The focus of these closed networks is on internal cost control and profit optimization. Unfortunately, these closed networks do not allow for an overall system optimization and as such they lead to operational inefficiencies such as empty running of vehicles, sub-optimal transit routing, higher overall costs, and generally inefficient asset utilization and increased emissions. Other issues preventing increased efficiency is the sector fragmentation, lack of transparency, constraints for mode selection, limited load consolidation, congestion, poor last mile performance, and negative environmental and societal impacts.

Scope

Freight Transport and Logistics sector is developing roadmaps for decarbonization[3] including different solutions to drive emission reductions beyond transitioning to greener transport vehicles and assets and renewable energy sources for transport including transport modes are smartly used and combined and fleets and assets are shared and used to the max.

The actions should consider state-of-the-art digital connectivity capabilities (e.g. developed in previous projects such as AEOLIX, SELIS and the guidelines of the Digital Transport and Logistics Forum and the implementation projects FENIX and FEDERATED and other available technologies).

However, digital connectivity is not the main barrier for a truly integrated transport system and therefore the focus of the Research and Innovation should not be on the digital aspects but on leveraging these capabilities through new concepts and solutions. The actions should propose pilot actions and demonstrations (3-5 Million €) in which two or more logistics operators or a value chain develop and demonstrate a systemic framework for connecting effectively the stakeholders independent logistics networks and develop a system of logistics networks in which assets and services are shared and flows are managed in a consolidated way demonstrating potential benefits. In particular:

Action A (R&I):

- Identify main barriers to achieve a system of logistics networks, propose solutions and pilot them to deliver guidelines for expansion and implementation.
- Develop open protocols to ensure operational connectivity of transport and logistics services provided by the independent logistics networks (e.g. services definition, parts of the network, services subject to the interconnected network, information flows, etc.) in a shared logistics network so closed networks of current operators gradually become connected networks with shared capabilities and supporting wider system optimization, load and asset balancing, and lower societal and environmental impacts from transport build up as true digital logistics platforms[4]
- Develop new concepts and solutions for the creation of a system of logistics networks in specific value chains (e.g. retail and related suppliers up to consumers, automotive value chain up to end consumer) also to ensure better interconnectivity of different sub networks (e.g. container, pallets, boxes, parcels etc.) in the and across value chains.
- Identify and demonstrate main potential gains of these logistics networks/systems of logistics networks compared to independent logistics networks.

[3] ALICE and LEARN EU project (2019). *Roadmap towards Zero Emissions Logistics 2050*. https://www.etp-logistics.eu/?p=3152

[4] Digital Logistics platforms are focussed on providing freight transport and logistics services and do not need to be mixed up with data sharing platforms dedicated to the exchange of information in the logistics and supply chain.

- Address governance aspects (e.g. how to expand the logistic network with other logistics networks willing to join or how to legally engage with users of these shared logistics networks services and capabilities) and propose actions to accelerate organic growth of these digital logistics platforms.
- Identify if any specific and concrete regulations preventing this shared and holistic approach building on the results and outcomes of previous projects (e.g. CO3, NEXTRUST, DTLF, etc.)

Action B (CSA):

While in some cases technology readiness and/or investment limitations have been identified as limiting factors, other solution areas and concepts that have been demonstrated in the past research & innovation projects as major potential contributions have not been taken yet at scale by industry. These are for example: inland flows synchronization and de-speeding of transport, synchromodality, horizontal collaboration aiming goods consolidation, etc. This coordination and support actions should identify, develop, and strengthen communication of the identified best practices in a comprehensive way and work out the limiting factors and barriers for a wider uptake, propose and test solutions overcoming those barriers.

Expected Impact

Projects will demonstrate energy and emissions reduction potentials higher than 20 % based on the operative gains without the need to renew the assets and with potential economic sound paths for take-up beyond the project duration. Impacts are expected on:

- Fleets and Assets are shared and used to the maximum
- Transport modes are smartly used and combined.
- Integrated management of traffic and logistics advancing towards a truly integrated transport system.
- Investments in infrastructure are reduced thanks to enhanced operations.
- Increased standardization of logistics processes.

Projects will also contribute to EU policy objective *A Europe fit for the Digital Age* by providing seamless, smart, safe, accessible and inclusive goods mobility systems to reap the benefits of digitalisation, increase efficiency and European competitiveness, enable better and sustainable door-to-door goods mobility.

Driving logistics offer and customers demand to green choices (through environmental impact visibility)

Expected Outcomes

People have access to goods and services delivered/made available in a sustainable way reducing the number of returns and the delivery of goods is pushed towards greener options.

End consumer is conscious of the environmental and climate change implications either positive or negative of their choice.

Retailers are incentivised with a growing demand of sustainable delivery options from end consumers.

Challenges

E-commerce is growing exponentially boosted by COVID-19 crisis that has increased online shopping more in 10 weeks than in the last 10 years[5]. Online retailers increase market share by offering same-day delivery and completely free return of goods to customers which is creating both increased logistics costs and negative environmental impact. The negative impacts on environment and society are huge, especially in urban areas in terms of rising congestion, noise, blockage of kerb space, air pollutant and GHG emissions and increased packaging waste. A large part of the solution lies with changing customer/consumer behaviour, yet a prerequisite is that customers are informed of the impact and given alternative choices which is not currently the case.

Scope

The objective will be creating transparency of GHG and other impacts of e-commerce and parcel delivery and a menu of options for city governments and retailers to nudge customers to make sustainable choices, still in accordance with their preferences and in combination with competitive and sustainable retail value propositions. In particular:

- Review and evaluation of good practices and impact achieved on end customers and citizens. Analyse and create an overview of existing impacts and future forecasted from online shopping delivery, in particular in cities, and existing solutions (government policies, solutions provided by start-ups, retailers and freight providers offering alternative delivery options, etc), and the pros and cons of each.
- Develop guidelines for retailers to make the GHG footprint of delivery from origin to destination transparent, and develop recommendations on how this can be put to practice by retailers themselves as well as through government policy
- Test with selected retailers and cities the draft guidelines, business models and solutions in real operating conditions, in order to visualize impact of returns, consumer behaviours and determine potential impact and acceptance by end customers and citizens of more sustainable offering and develop recommendations for improvement.
- Testing and validation of potential strategies and business models to change consumers' and sellers' behaviours towards greener freight delivery choices, based on advanced information on delivery-related emissions and impacts of alternative delivery solutions.

[5] https://www.cnbc.com/2020/05/24/niche-online-brands-benefiting-as-covid-19-leads-to-e-commerce-surge.html, https://www.ecommercemag.fr/Thematique/retail-1220/Breves/Post-Covid-consommateurs-europeens-continueront-leurs-achats-ligne-349678.htm

- Strengthen the coordination and collaboration between existing stakeholders and networks of cities, companies, research and civil society, in Europe and internationally, to give input to the project as well as disseminate and exploit results.

Expected Impact

- Overall climate and environmental impact is reduced.
- Contributing to congestion reduction.
- Consumers and citizens are more conscious of the environmental and climate impact of their choices so they can be directly engaged in driving emissions reduction.
- Acceleration of ultralow or even zero-emissions delivery processes.

Exploitation of big, heterogeneous transport data to support automated decision making in Physical Internet

Motivation/Challenges:

Currently, a vast amount of transport data from different parts of the transport system remains unexploited. If these data were publicly available, collected, contextualised, and combined more optimally, this would enhance machine learning models' ability to infer useful patterns from both historical and real-time data.

One challenge is how to open currently siloed data sources so that heterogeneous transport data can be combined and applied in useful application. Understanding barriers and opportunities related to data sharing within the transport system can be a first step to encourage private and public organisations to share their transport data.

Furthermore, convincing arguments on why organisations should share their data, should be followed-up by some transparency on how data is processed in order to give input to the decision-making process. Establishing understanding of the full data processing lifecycle, from data collection to decision making, is important in order to build trust in that the data are not mis-used or misinterpreted.

Before prediction analytics can take place, prerequisite activities encompassing exploration, organisation and cleansing of datasets must be performed. This is a cumbersome and resource-demanding effort that requires that the data are assigned descriptive metadata. Metadata management often relies on human intervention, but with extensive amounts of data this task quickly becomes unmanageable, and automated methods for supporting metadata management becomes necessary. Representing the data using sensible (and machine-understandable) metadata describing the quality, provenance and conceptual grounding of the data instances is an important task in this regard.

Scope:

Encourage data sharing

- Establish an understanding of barriers that prevent data sharing in the transport sector and opportunities that can help overcoming the barriers taking also into account economic, legal, social, institutional and technical aspects.
- Establish business models that encourage data sharing and improve the findability, accessibility, interoperability, and reuse of digital assets.
- Establish governance models for safe and secure sharing of data

Establish a "common" understanding and agreed solutions on use of AI / ML based on shared transport data

- Develop techniques for prediction analytics that use diverse transport data in order to support automated decision support
- Investigate strategies for providing transparency into the prediction analysis process using strategies from explainable AI.
- Demonstrate innovative decision support solutions for green and efficient transport.

Metadata management using language processing and semantics

- Investigate and establish methods for (semi) automated assignment of different types of metadata to large-scale data

Expected Impacts:

- Reduced barriers for data sharing in the transport system.
- Increased data sharing that supports and improves efficient and sustainable transport.
- Increased perception and trust from the stakeholders of the value chain to the innovative decision support solutions' results
- Improved metadata management lowering the threshold for using shared transport data in innovative transport solutions.
- A common architecture facilitating interoperable solutions consistent with the physical internet.
- A physical internet ecosystem where data are shared according to standards and supported by viable business and governance models.
- Innovative use of transport data-driven AI to improve efficiency and sustainability in transport

Long Distance Freight Transport / Logistic Systems Integration and Harmonization

This topic is being discussed in the frame of the ERTRAC Long Distance Freight Transport

Specific Challenge

Seamless transport of freight is essential for improving operational efficiency and avoiding congestion. Freight transport should progressively continue to evolve into integrated-bundled-services, such as systems-of-systems services, increasing the load factor, avoiding empty runs and progressively converging into the physical internet. Another key point in operations is the establishment of multimodal solutions fostering standardization and modularization of freight packaging and automated loading and unloading processes to minimize transshipment time and complexity between different modes of transport and to optimize trucks' load factor.

Scope

Large scale pilot activities linked to TENT-T network including Motorways of the Sea and Short Sea Shipping, e.g. at Confined Areas (e.g. ports, logistics terminals, consolidation centers, truck parking), Hub-to-Hub, Open Roads and cities: Demonstration of viable use cases of pan European multi-modal freight logistics ecosystems, enabled by automation and connectivity (in a system-of system approach) covering both digital systems (information related to goods), and flexible movement of goods in hubs (included automated handling) and roads. This context needs a global approach including legal and economic matters.

A/ Ensure an efficient and resilient road transport system: develop affordable, efficient and sustainable freight transport and delivery solutions.

- Enhance vehicle efficiency with coupled infrastructure for reduced congestion & energy use.
- Long-haul and urban mobility, using innovative and shared transport services provided by innovative low and zero-emission vehicles, as well as adapted hubs, achieving near zero impact emission in urban areas, whilst reducing emissions in long-haul legs.
    - Planned Logistics in ports / hubs / roads and cities (based on CO2 emissions info, traffic management info, etc.) enabled through smart or Intelligent Access Policies harmonization regulated by local/ regional authorities
    - Further enhancement of pan-European modular high efficiency transport
    - Fully integrated, consolidated & circular multi-modal transport services for goods (incl. prospective analysis of needs and use cases with a focus on the ergonomic design of future hybrid vehicles able to forward both passengers and goods)
    - Smart co-modal infrastructures and vehicles, and robotized freight delivery

B/ Secure digital logistics service processes & data handling

- Cybersecurity & Tracking of the vehicles
- Interoperability of digital operating platforms (between freight operators)
- Integration of modal solutions in one single system (between modes)

- Risks and liabilities of stakeholders for new integrated-bundled-services

C/ Large scale demonstration and pilots

- Use of Green Corridors as living labs
- Large scale pilot activities at Confined Areas, Hub-to-Hub, Open Roads
- Integration of logistics, transshipments and co-modality to help defining the necessary standards and regulations (Intelligent Access Policies)

Expected impacts

- Decarbonisation towards near zero emission logistics by 2050; seamless and green supply chain
- Increased transshipment efficiency by 30%*
- Increase Load factor by 30%*
- Increase and improve use of transport electronics procedures

*Identify realistic base lines

Women in Transport Logistics

The topic resulted from the discussions at the ALICE/LRA Ladies' Logistics Breakfast in February 2020 in Vienna and may be considered better for the Work Programmes 2023-2024 after the results of ongoing projects TinnGO and DIAMOND are available.

Challenge/Motivation

Transport logistics mostly triggers negative emotions and is perceived as a dirty sector, mainly associated with traditional truck driving or physically demanding jobs, and assessed as a complex, mainly technology-oriented sector. Transport logistics is not associated with a chance to tackle societal challenges or attractive jobs, which discourages (young) women to study or start their career in transport-relevant fields.[6]

Thus, the transport logistics sector is still mostly male-dominated. This also applies to logistics studies in general, with still far fewer female than male students.[7] Women are confronted with a lot of stereotypes and prejudices in this sector and are underrepresented, especially in leadership positions. Also, speakers on transport logistics events are generally men.[8] Female role models are mainly missing.

[6] https://mobilitaetderzukunft.at/de/publikationen/guetermobilitaet/projektberichte/berufsbilder-und-chancen-fuer-beschaeftigung-in-automatisiertem-und-digitalisiertem-oesterreichischem-mobilitaetssektor.php

[7] https://mobilitaetderzukunft.at/de/publikationen/guetermobilitaet/projektberichte/exchanges-gueter-logistik-und-die-genderperspektive.php

[8] https://mobilitaetderzukunft.at/de/publikationen/guetermobilitaet/projektberichte/exchanges-gueter-logistik-und-die-genderperspektive.php

Whereas transport logistics systems were designed by men for men over the last centuries, female innovation potential has not yet been fully tapped. Yet, digitalisation of the transport logistics industry and the need for sustainable transport logistics solutions promise to reshuffle the pack. The sector is undergoing a profound transformation under the effects of digitalisation, which could be a major driver to attract women in the transport sector. Moreover, ICT in the transport sector calls for highly-qualified knowledge and interdisciplinary thinking where mixed teams are performing better. Digitalisation promises to change job profiles, with less emphasis on physical fatigue in the future, thus opening up career opportunities for women.[9]

Previous studies mainly investigated the individual mobility behaviour of women, such as the use of cars or public transport, in comparison to men[10]. This CSA focuses on women in transport logistics, individual mobility behaviour is not part of this CSA.

Expected Outcomes

The major goal is to increase the share of women in transport logistics by

- Identifying and implementing pathways to attract more women for the transport logistics sector to enlarge the pool of potential employees for all levels also in senior leadership positions
- Raising the visibility of successful senior female employees in the transport logistics sector to support their role model position with the aim to show, that the sector is an attractive working field for women and to raise awareness, also among men, that women contribute to the success of the industry, thus reducing existing prejudices among men and against women
- Raising awareness of discrimination against women in the selection for promotions and representations within the sector with the aim to reduce frustrations with female employees and to ensure the transport logistics sector remains an attractive working field for them so they don't change industry
- Identifying, analysing and raising awareness for the needs of a diverse society in relation to transport logistics with the objective to prepare management and decision makers – existing and future generations – for the changed needs in our society. Such an adaptation and reform is critical in a connected diverse world to ensure the economic success of the European transport industry on an international scale also in the future

Scope

Proposals should pay particular attention to the following areas:

- Data collection & analysis:

[9] https://mobilitaetderzukunft.at/de/publikationen/guetermobilitaet/projektberichte/berufsbilder-und-chancen-fuer-beschaeftigung-in-automatisiertem-und-digitalisiertem-oesterreichischem-mobilitaetssektor.php

[10] EIGE (2016). *Gender in transport*. Luxembourg: Publications Office. Retrieved from https://eige.europa.eu/publications/gender-transport

  - Collecting and analysing European data about job positions of women in transport logistics, analysing companies, research organisations and other institutes separately, and investigation of e.g. country-specific differences.
  - Collecting and analysing European data about transport logistics relevant trainings and studies and participation of women therein as well as specific measures implemented for attracting women for this trainings and studies.
  - Analysing career paths of female graduates of study programmes in transport logistics, comparing it with male graduates. Identifying career obstacles and drivers including the value of digitalisation.
  - Collecting and analysing measures implemented in transport logistics industry for promoting women/addressing gender issues.
  - Mapping women in transport logistics networks all over Europe, creating a database and analysing their structure, missions and actions.
  - Identifying a list of female European role models in (transport) logistics and establishing a database for potential female keynote speakers within the transport logistics industry.
  - Publishing scientific results about the collected and analysed data
- Based on the Data collection & analysis results, deliver a Master Plan, with a bold vision, a roadmap with milestones and first measures including assessment methods to increase Women in Transport Logistics until 2030. These measures should among others include
  - Attracting women to be researchers in transport and logistics by engaging with university graduates from different disciplines (maths, engineering, economics, statistics, etc.) and showing the importance of logistics for a sustainable planet and the deeply need to transform the sector.
  - Organizing networking events dedicated to women at transport logistics relevant conferences such as TRA, EurOMA etc.
  - Identifying gaps in the coverage of needs of a diverse society currently not taken into considerations by transport logistics industry and concepts in general, and develop approaches for their closure
  - Identifying focal points of strategies and structures within the transport logistics industry which hinder and prevent innovative and diversity-integrating developments and develop pathways for overcoming these hurdles, including necessary political and regulatory frameworks

Expected Impact

For sustainable transport logistics solutions to be implemented, increased cross-company and cross-modal collaboration along the supply chains and supply networks is needed to drive transition.[11] Women in management positions are often characterized by a more collaborative leadership style emphasising

[11] http://www.etp-logistics.eu/wp-content/uploads/2019/12/Alice-Zero-Emissions-Logistics-2050-Roadmap-WEB.pdf

rather teamwork than competition. Moreover, women are generally supporting a higher level of sustainablity than men, not only in transport behaviour but also in consumer behaviour[12]. Thus, a higher share of woman in leadership positions can contribute to more sustainable management decisions. Previous studies investigated, that the more diverse a company's leadership is, the more innovative they are.[13]

Above all, the consideration of gender perspectives and aspects within research, technology and innovation projects and in organisations themselves can contribute to the increased integration of gender and diversity dimensions in the development of products, processes, services and business models, through which improved quality of them can subsequently be achieved.[14]

Urban Logistics

Developing new solutions for logistics consolidation and space management in cities.

Involvement of real estate companies, service vehicles companies, logistics service providers and couriers together with cities to develop sustainable business models for clean hubs/ consolidation spaces in cities (using/sharing existing private locations such as parking's, banks and other potential available spaces in cities) compatible with temperature-controlled delivery (e.g. reefer lockers) and inspired from the Physical Internet concept. Propose and demonstrate economic viable solutions in a sustainable way, identifying governance/regulatory models that can influence the convenience of consolidation and consistent with the full planning of loading and unloading spaces to deliver the services and the goods.

Additionally, solutions for urban planning and space management (for example space allocation for loading and unloading) should be developed to ensure there are mechanisms to reduce and potentially we move towards an scenario in which there is no double parking in cities. In most cases, there are not reasonable alternatives for couriers and delivery companies to avoid double parking and congestion caused because of it.

Identification, development and take up of best practices for urban logistics decarbonization, air quality impact reduction.

The objective will be for main stakeholders: cities, logistics operators, couriers, real state, and retail to define and share suitable principles for the development of sustainable logistics and delivery models in cities (economic, social and environmental). Main areas for these best practices' identification are: air quality and low emission zones / data / consolidation and space management/ clean and alternative

[12] EIGE (2016). *Gender in transport*. Luxembourg: Publications Office. Retrieved from https://eige.europa.eu/publications/gender-transport

[13] https://www.bcg.com/publications/2018/how-diverse-leadership-teams-boost-innovation.aspx

[14] https://mobilitaetderzukunft.at/de/publikationen/guetermobilitaet/projektberichte/exchanges-gueter-logistik-und-die-genderperspektive.php

vehicles / stakeholders dialogue & sustainable urban logistics plans / environmentally friendly e-commerce solutions. Replicable/up scalable best practices should be prioritised. Focus should be given on certain type of solutions: e.g. construction, e-commerce and omnichannel retail, transport for services, deliveries to retail outlets, etc.

Data empowering cities for policy implementation and decision making in urban logistics

The objective would be that cities develop and demonstrate how building data sharing capabilities is supporting in achieving sustainability targets such as decarbonization, air quality, reducing congestion and better use of public space. Several purposes focussed data collection use cases should be developed (for example, to increase utilization of loading and unloading spaces, manage bigger volumes of goods with less vehicles/kms driven and less pollution) to build trust among stakeholders and evaluate the needs for further regulation.

Identification and development of key city policies that are data driven: implementation of zero emission zones, smart access regulation and geofencing, parking space allocation and dynamic space management and further valorisation in regards of urban freight and logistics planning: understanding urban freight movements, estimation and measurements of the impacts achieved by new measures.

Define the data required for each use case: type of flow including service vehicle trips and sector addressed, trips, type of vehicles, timing, stops, content and vehicles as well as the framework for freight transport operators to provide this data (benefits and incentives such as favoured access, allocation of loading/unloading spaces, etc).

Governance and regulation as an enabling element for an effective and large-scale deployment of innovative and sustainable solutions

Cities need to define robust freight strategies and action plans to ensure the local economic development, considering the social and environmental dimensions. This should start from a clear and shared definition of the impacts to be achieved (e.g. reduction of emissions, traffic related to logistics, improvement of air quality, management urban spaces, etc.). For this to happen, it is essential to identify the public-private stakeholder cooperation mechanisms which facilitate a fast and effective co-creation of public policies in the field of urban freight and logistics.

Urban freight GHG data transparency and access for informed decision-making by cities and companies

The ALICE Roadmap towards Zero Emissions Logistics 2050 includes a variety of solutions to decarbonize urban logistics, and emphasises the importance of reporting and collaboration. Urban logistics has proven itself a difficult sector to track for both cities and companies, which creates an opportunity for collaboration between various stakeholders to meet mutual climate and air quality goals.

The objective is to develop a city framework for a GHG data calculation, collection and sharing that is harmonised, transparent and reliable to allow governments and companies to take informed decisions for policy-making, infrastructure and reduction measures, as well as track progress.

- Design the conditions necessary for the collection and sharing of data that are needed for urban freight policy as well as concrete emission reduction solutions, and that involves governments, companies, and other stakeholders, in particular providers of ICT solutions and transport models, building on and deepening of existing methodologies especially the Global Protocol for Community-Scale GHG Emission Inventories: An Accounting and Reporting Standard for Cities and the GLEC Framework for Logistics Emissions Accounting and Reporting. Air pollutants should be considered where feasible.
- Develop harmonised city guidelines for the calculation and reporting of GHG emissions from urban freight services, which can be applied by city governments, freight suppliers and their customers.
- Test for selected cities with relevant city governments, companies and other stakeholders the city guidelines to certain specific cases, to determine where challenges arise in data collection, quality of data and sharing of data, and work out how this can be addressed through collaboration.
- Strengthen the coordination and collaboration between existing stakeholders and networks of cities, companies, research and civil society, in Europe and internationally, to give input to the project as well as disseminate and exploit results.
- Develop and test training tools for cities and companies, including data collection/sharing, emissions calculation, reporting, and using results for key decisions.