

ALICE Working Groups Descriptions

WG1: Sustainable Safe and Secure Supply Chains

Vision

The vision of the WG is to do more with less and ensuring safety and security in the supply chains thereof contributing to the 30 % increase in logistics performance. This will mean: avoiding waste, using less energy, exploiting renewable resources wherever possible, and advancing re-use of products and materials and at the same time, fighting against terrorism and crime, including theft, avoiding accidents, risks for human life.

Mision

Identify and define research and innovation challenges to improve sustainability, safety and security, efficiency and profitability by defining smart supply chain solutions for an increased security, a high reliability and resilience by enhanced safety against accidents and extreme weather conditions and to meet security demands without shrinking the effectiveness of the goods flow and the standard of life. To that end, the impact of choices at each phase of the supply chain on logistics in terms of sustainability and profitability has to be carefully reviewed.

Scope: Research and Innovation Areas and Challenges

In the near future more compelling objectives concerning the external impacts of logistics will need to be incorporated in supply chain design and, consequentially, transport as well. Most probably these objectives will surpass the potential performance improvements that can be gained by efficiency increase. Supply chain solutions will need to be weighed against transport level (sub-) optimization. Once this short term potential is depleted new solutions will need to be introduced, in order to achieve a more liveable and sustainable society. These solutions will build on the internalization of external costs and on the capture of value based on the willingness to pay of consumers for more sustainable products and services. Both constitute difficult challenges. It is uncertain how the willingness to pay of consumers will evolve, but it is expected to be highly situational. The internalization of external costs constitutes a paradigm change, where charging based on marginal social costs will be the goal. Both innovations require new business models, a closer link with operations (for fair and efficient pricing) and will undoubtedly result in changes in supply chain design. How this new supply chain designs will look like, and what they will require from transport operations, is part of the question. It is certain however, that anticipation is needed if long term objectives for a reduction of external effects have to be achieved.

Below we provide a **first list of relevant research and innovations domains**.

- **Sourcing and product design:** choice of (lightweight) materials, product modularity, package design, resilience design of vehicles and infrastructure all have a profound impact on both logistics efficiency and its ecological footprint. Examples include: modularity and final assembly close to the customer that enhance truck utilisation, enhanced extreme weather capable design of vehicles and infrastructures including fall back facilities.

- **New technologies:** the rapid advance of 3D printing will have a profound effect on logistics efficiency. Remote monitoring, real time observation of transports (localisation, sensors for freight and loading equipment condition monitoring, diagnostics and repair of advanced systems help to limit travel and personnel costs in service logistics and enhances security. Synchronodal navigation systems help to design flexible, cost-efficient and sustainable transport choices at any point in time.
- **Production and distribution:** aspects of internal logistics (smart inventory management, shared warehousing), as well as modal shift (multimodal solutions), consolidation and coordination of transport and distribution activities including IT solutions for network optimising both along and across supply chains.
- **Event management and fall back processes along the supply chain:** facing the risen complexity, danger of transport interrupts due to congestions, extreme weather events and attacks in extreme cases need complex interdisciplinary methods. We need risk management and assessment tools covering the total supply chain which may assess the value of reserves and buffers and adapted management tools (IT solutions but also adapted process management solutions).
- **Logistics security management:** political demands due to fears of terrorism to enhance security has provided many burdens to the logistic sector. Crime is still an issue and violence and organisation of criminals still rise. 100% security cannot be assured only by controls at every step of the transport chain (with the extreme idea of 100% x-raying of containers in sea ports). This would lower efficiency and rise costs up to unacceptable limits. We need enhanced systems to provide security in transport by efficient combinations of staff, organisation and technical measures to enhance security while limiting additional operational costs and sustaining process efficiency.
- **Usage, service, disposal and re-use:** the aftersales service market provides exciting new business opportunities to both manufacturers and logistics service providers, may help to extend a product's lifetime at reasonable costs, provides learning opportunities for improved product design, and finally helps to properly decide on replacement and next generation installation. Reverse logistics helps to further advance the cradle-to-cradle philosophy, while leading to exciting new business models.
- **Real time accounting and charging of external costs:** Worldwide, standards are being developed (mostly on a continent-by-continent basis) for emissions, to allow emission monitoring, accounting of external costs and awarding of efficient operations. For global supply chains to operate efficiently, these standards will need to be harmonized. The longer term development of these monitoring and accounting systems is that they will operate on the basis of real time observation. This will allow a more fair and more efficient operation of real time emission measurements, and promote accountability for external effects along the entire supply chain.
- **Approach of "usage of services" instead of "ownership of products":** and offers less environmental impact, requires another service framework accompanying the products (car sharing for instance). Sustainable logistics intersects with all four other Working Group targets. Typically, a sound ICT infrastructure is at the heart of any improvement (sustainable planning tools, environmental

impact assessment, cyber security and privacy, etc.). Coordination, collaboration and synchromodal transport solutions all aim to reduce the ecological footprint, while at the same time improving competitiveness. The ongoing urbanization, its environmental consequences, the need to cope with legislation and social responsiveness only stipulates the urgency of more sustainable logistics.

Within WG 1, we focus in particular on manufacturers, shippers, logistic service providers, infrastructure managers and authorities to generate new solutions and business models and processes able to cope with the challenge to unite sustainability, safety and security with profitability and efficiency objectives. The WG program should not just aim at research but merely develop pilots and demonstration projects that are scalable, in order to provide maximum added value.

ALICE WG2: Corridors, Hubs and Synchromodality

Vision

Provide logistics community: Shippers, Logistics Service Providers and Transportation Companies, with a smart and seamless network of interconnected (physical movements of goods, information,) corridors and hubs allowing efficient logistics operations and supporting resilient supply chains.

Mision

Identify and define research and innovation challenges to accomplish an European core freight network of hubs and corridors to serve the needs of the transport using industries and those of the citizen, in a sustainable way. The key challenge in the realization of this mission is the integration of its fragmented parts towards a seamless, European co-modal system.

Scope: Research and Innovation Areas and Challenges

In addition to the current focus on strategic investments and policies, the new **focus of innovations includes:**

1. **Supply chain perspective**, i.e. integration with logistics processes of transport users
2. **Integration of network operations**, via integration of processes in partial transport networks, to systems across modes, actors and spatial scales
3. **Fast deployment of new technology**, including transport technology and ICT

These 3 perspectives are related as follows: Supply chains represent the vertical relations, between the transport industry and its clients. Integration of networks represents the modern way (not via design but via operations) to get to synergy between horizontal activities. Fast deployment represents the dynamic or process perspective, needed to make sure that changes in the vertical and horizontal dimensions are achieved without delay.

1. Supply chain perspective

A closer link between the transport system and industrial supply chains needs to be organized, for two reasons. The European transport sector should, on the one hand, keep up with the evolving needs of transport using sectors (e.g. near-shoring of high tech, biofuels markets, 3D printing), to support the

competitiveness of Europe's industry and to be able to satisfy consumer needs. In addition, as transport is an important source of GHG emissions, change will need to be brought in co-operation with the shippers, to avoid suboptimal situations.

Questions for the WG2 roadmap include:

- Which hubs and corridors are important for which transport using industries, cities and regional clusters?
- What qualities are needed by which industry; what are the required geographic specializations of corridors and hubs?
- What new service segments can be identified to tune transport services to the needs of the industry, and how can these niches be stimulated?
- How should networks become responsive and adaptive to changes in Europe's industries?

2. Transport integration

Network integration requires a close understanding of the primary processes of actors and their business models, including those of the private industry and those of public authorities within cities, regions and member states. It is through these primary processes that innovations can permeate into the whole transport system, throughout the entire supply chain and from major, leading firms towards the SME's. Collaboration between actors will be essential to cope with future pressures on efficiency and transport impacts. This collaboration requires a fit between operational processes of potential horizontal and vertical business partners. Also, with the sustainability objectives in mind, internalization of external costs can only be realized when the proper operational infrastructures for measurement, verification and accounting are in place.

Questions for the WG2 roadmap include:

- How can an integrative network of terminals be governed and managed?
- What measures are needed for a seamless integration of services between different actors, regions, and modes of transport?
- What is the effect of improved collaboration between shippers on the demand volumes and required qualities of hubs and corridors?
- How does a network look like of green hubs and corridors? How should emissions reduction be done by parts of the network?
- How can transport operations be tuned to provide a wider array of services (e.g. continental and maritime traffic, empty containers) in one seamlessly connected network?

3. Fast deployment of technology

The pace, at which the technology frontier in the transport world is developing, in particular ICT, is unprecedented. Deployment of these technologies within Europe is however still hampered by widely differing operational practices and standards. This does not only restrict the speed of implementation of main axes and hubs of the large scale EU transport network, it also acts as a hand break on the speed of innovation itself.

Questions for the WG2 roadmap include;

- What measures are needed for a fast deployment of the most critical innovations along those parties that determine the performance of hubs and corridors
- Which European software platforms, architectures, standards and governance approaches are needed to ensure EU wide adoption and use of ICT?

- How can living labs be developed by the logistics industry in a triple helix setting order to shorten the life cycle of innovations?
- Which transport technologies can improve asset utilization (loading units, railcar technology)?

ALICE WG3: Information Systems for Interconnected Logistics

Vision

Supply chains that are fully integrated and coordinated by the use of ICT solutions available and affordable for all kind of companies and participants, whether large or small, to rapidly setup and tear down supply chain networks.

Mision

Identify and define research and innovation challenges including the development of technologies and standards that facilitate the closure of the existing gaps in current ICT systems and their application to supply chains so that the very best performance in the execution of supply chain activities can occur, including large or small participants.

Scope: Research and Innovation Areas and Challenges

Modern supply chains are complex networks of independent organizations working together to move and transport goods from conditions of lower value to ones of higher value. The complex nature of these networks requires that the various actors operating in them coordinate their actions in a highly integrated manner if desired outcomes are to occur. Unfortunately, the current state of ICT systems are such that only the most technology savvy and capital rich organizations can successfully participate in, or manage, these complex networks. The high cost of current ICT systems, and the level of technical sophistication necessary to integrate and operate them, excludes all but the largest logistics players. These factors work to the disadvantage of SMEs who have neither the capital resources necessary to purchase the sophisticated ICT required, nor the technical resources necessary to operate these systems. Besides disadvantaging SMEs, the current state of ICT in the industry also discourages innovation. Once supply chain partners have managed to setup a network, integrating participants and establishing rules for their management, it is very difficult for them to change their processes. For this reason, novel technologies, such as auto ID technologies or other sensor based tools are generally ignored since they would require fundamentally changing the networks that have been established through the costly efforts of the current partners.

The situation that the transport and logistics industry currently finds itself in calls out for a new approach to the building and managing of supply chains. What is required are new tools and standards that allow all participants, whether large or small, to rapidly setup and tear down supply networks. **Such tools should focus on issues such as:**

- A standard format for communicating between supply chain partners that facilitates the rapid and simple connection of all partners including governmental agencies, customs authorities, shippers, third party service providers and any other entity required to ensure the proper functioning of the supply chain;
- Simple connection and integration tools to facilitate usage by non-technical personnel so that all organizations can participate in supply chain activities on a level playing field;

- Software utilities that allow SMEs to properly manage their portions of a supply chain without having to incur unreasonable costs for licenses, operation and maintenance;
- Simple and cost effective sensors or smart devices that operate using common and readily available communications technologies that reduce the cost of usage and encourage their integration into supply chains;
- Open and standardized visibility and event management systems that allow supply chains to be managed efficiently and effectively;
- Secure and trustworthy data management approaches that ensure that an organization has the ability to positively manage its data without intrusion by unauthorized third parties;
- Simple and standardized accounting processes to facilitate reporting of performance as well as to encourage open tracking of societally important factors such as carbon emissions, fuel consumption, safety, etc.

Within ALICE the focus of the ICT pillar will be to encourage the research and development of technologies and standards that facilitate the closure of these major gaps in current ICT systems so that the very best performance in the execution of supply chain activities can occur.

ALICE WG4: Supply Chain Coordination and Collaboration

Vision

Supply chains that are operated as a whole, meaning full vertical and horizontal integration and coordination.

Mision

Identify and define research and innovation challenges to achieve breakthrough EU Logistic efficiencies via removing barriers through new concepts and approaches, wherever they are, for closer Vertical and Horizontal Collaboration among different supply chain owners in Europe.

Scope: Research and Innovation Areas and Challenges

A key development expected in the next decade is the transition from the current independent supply networks, where transport and logistics resources cannot be shared or accessed by different cargoes and shippers, to open global networks where resources are compatible, accessible and easily interconnected. This will enable innovative freight management practices in two main areas:

- *Supply Chain Collaboration* will deal with maximising resources utilization, such as vehicle and infrastructure capacity, by matching demand from multiple shippers with available transport and logistics services from different modes and service providers. This type of collaboration is also referred to as horizontal collaboration.
- *Supply Chain Coordination* will deal with the provision of door-to-door services based on the synchronization and dynamic update of logistics and transport plans across a variety of actors (manufacturers, retailers, logistics services providers, carriers, terminal operators). This practice is also referred to as vertical collaboration.

Identify reapplication potential from other business sector as well as the need of Pilots for new best practices and how to best Leverage the Horizon 2020 program toward the innovations needed.

Possible areas of interventions will be:

- Business models
- Logistic Technologies and tools to identify collaboration opportunities and maximization of the use of resources.
- Information Management (Data matching, Standards, Security, Protection of Confidentiality rights etc)
- Legal Framework development
- Methodologies
- Best practices dissemination.

ALICE WG5: Urban Logistics

Vision

Full integration of freight flows in cities operations and activities that allow citizens to access the goods they require and at the same time supporting sustainable development in cities.

Mision

Identify and define research and innovation challenges to optimize flows of goods within, into and from urban conglomerates by leveraging existing infrastructure.

Scope: Research and Innovation Areas and Challenges

Several aspects show the complexity of the problem: increase of urbanization and the aging of the population; lack of appropriate transportation and logistics infrastructure; shortage of affordable space leading to urban sprawl, which means that freight transport has to cover more distance; increase in pollution (and noise) from various activities, with transport as an important source of emissions. This also leads to major challenges faced by businesses: low service levels; high on-site storage requirements, resulting in suboptimal utilization of space and significant capital investment; higher city complexity and customer demands result in an increase in supply chain and logistics cost; or the growth of e-commerce.

One of the big challenges for urban logistics is to achieve virtually CO₂-free city logistics in major urban centres by 2030 (white paper on transport). Therefore, the concept of Urban logistics addresses the social and ecological needs of metropolitan areas and also aims to reduce the total economic cost of urban goods movement.

This concept deals with aspects of like:

- How to redesign logistics processes and infrastructure (e.g. urban distribution centers close to city borders, where freight is consolidated with last mile transportation by standardized electric vehicles)

- Using alternative infrastructure to road transportation or maximizing current infrastructures by means of different models of usage (like using public passenger transportation networks for freight at nights)
- A sound information infrastructure for retailers and consumers (also in view of the rapidly increasing internet sales)
- Optimizing the use of the infrastructure in space and time for urban freight activities, including the dynamic use of dedicated lanes, relying upon ITS when relevant
- Collaboration and upfront dialogue between customers of logistic services, retailers, governmental authorities, local administrations and logistics providers to reduce emissions, noise, congestion and the like, and adequate safety and security procedures
- Flexible fleet sharing to increase load factors
- Direct to consumer deliveries and functional logistics services
- Use of improved traffic management and a better use of data on urban freights
- Urban freight policy and freight transport operators: financing models, roles, governance structure, etc.
- Optimizing reverse logistics and transport of waste and recycling material
- Links between passenger and freight transport in the urban environment
- Urban freight transport demand: how to influence the demand, its evolution, its characteristics according to sector of activities, etc.