

ALICE Recommendations to H2020 Work Programs 2018-2020

December 2016

ALICE, Alliance for Logistics Innovation through Collaboration in Europe, is the European Technology Platform for Logistics, launched on June 11, 2013, and receiving official recognition from the EC in July 2013. ALICE develops a comprehensive strategy for research, innovation and market deployment of logistics and supply chain management innovation in Europe. Following its mandate, ALICE is providing recommendations for the next Work Program 2018-2020.

ALICE is addressing freight transport and logistics with an integrated perspective in two ways: What to transport and how to transport. ALICE addresses areas such as **Synchromodal Freight Transport, Urban Logistics, Circular Economy & Logistics, Integration of Transport and Manufacturing to build Smart Supply Chains and Safety and Security issues related to goods trade**. Moreover, Logistics is a promising field to leverage the full potential of technologies such as **Internet of Things, Big Data, Robotics and Autonomous Systems** towards increased **efficiency and sustainability of European Industry** and also contribution to **sustainability, minimizing environmental impacts of freight transport and congestion**. Therefore, these recommendations are directed to the following Horizon 2020 Work Programs:

Table 1. Work Programs to which ALICE recommendations are directed

Work Program – Sections to which recommendations are directed	Acronym*
Smart, Green and Integrated Transport - <i>Logistics, Urban Mobility, ITS, Infrastructure, socio-economic and behavioural research</i>	MG
Secure societies	SEC
Climate Action, Environment, Resource Efficiency and Raw Materials/Waste	CIRC
Nanotechnologies, Advanced Materials, Advanced Manufacturing and Processing, and Biotechnology - <i>INNOVATIVE AND RESPONSIBLE GOVERNANCE OF NEW AND CONVERGING ENABLING TECHNOLOGIES</i>	NMBP
Information and Communication Technologies – Big Data, Robotics and Autonomous Systems	ICT
Internet of Things PPP	IoT
Factories of the Future PPP	FoF

* See table 2 with the High Priority Topics and the program to which they are recommended.

Process to build consensus on ALICE recommendations to H2020 Work Programs 2018-2020

In December 2014, ALICE delivered five [Research and Innovation roadmaps](#) to achieve its Mission:

1. [Sustainable Safe and Secure Supply Chains](#)
2. [Corridors, Hubs and Synchromodality](#)
3. [Information Systems for Interconnected Logistics](#)
4. [Global Supply Networks Coordination and Collaboration](#)
5. [Urban Logistics](#)

These roadmaps included research and innovation gaps and challenges that needed to be addressed to drive the process from the current situation to the desired one, including milestones for 2020 and 2030. On top, several enablers and opportunities were identified in those roadmaps.

ALICE has been working in the preparation of ALICE Implementation Plan of the Roadmaps for more than one year in the frame of H2020 project SETRIS¹. Thus, 29 topics have been identified as relevant for [ALICE Research Roadmaps](#) Implementation. The detailed methodology for this work is included in the [Annex](#). As a summary, the work has been done in 5 phases.

Phase 1: ALICE Working Groups small focussed workshops (Oct-Nov 2015). 5 Workshops, one for each ALICE Working Group, were organized between Oct-Nov 2015 to brainstorm and identify key topics that needed to be addressed for the implementation of ALICE roadmaps.

Phase 2: ALICE Executive and Steering Group Sessions (Nov 2015). The outcomes of the workshops and the identified topics were discussed with the members of the Executive and Steering Group in a meeting on the 15th of November 2015 in Brussels.

Phase 3: Consolidation of topics and broader discussion. Vienna Workshop, (Feb. 2016). A major Workshop was organized in Vienna with more than 100 attendees to refine the topics and raise consensus.

Phase 4: Consolidation and finalization of ALICE Implementation Plan (March-Oct 2016). SETRIS project partners consolidated the input received during the workshop in Vienna. The resulting description of the topics was broadened enormously, therefore the topics included a very well detailed and comprehensive identification of the challenges. As a result of the activities performed, 29 differentiated topics have been identified as the key logical steps in the implementation of ALICE Research and Innovation Roadmaps.

Phase 5: Prioritization (Oct-Nov 2016). Topics were Prioritized by ALICE members in order to properly assess the urgency and importance of the topics to be addressed in H2020 calls.

As a result 14 topics have been identified as of high priority to be addressed in the upcoming WPs 2018-2020 (Table 2. High Priority Topics Recommendations for H2020 WPs 2018-2020).

Topics Agreed by All Transport ETPs

ALICE, together with the other Transport ETPs, namely Acore, ERRAC, ERTRAC and Waterborne have agreed on the high priority and value to address the following topics:

- **Strengthening European cross-modal Freight Transport Research and Innovation supporting innovation and deployment strategies.**
- **Seamless Mobility through End to End mobility and data exchange**
- **Efficient and sustainable supply chains through seamless data exchange across modes and transport users²**

All these topics are proposed as 1.5-3 Million CSAs in Mobility for Growth Work Program.

¹ SETRIS, Strengthening European Transport Research and Innovation Strategies". Horizon 2020 GA No 653739

² Note that this topic is similar and aligned with ALICE topic [Secure data exchange and access to build trust](#) hence, it is expected that a combination of both is addressed in the calls.

Table 2. Very High Priority Topics Recommendations for H2020 WPs 2018-2020

Topics of Very High Priority <small>* Includes link to further description * Nr. of topic corresponding to ALICE Implementation Plan</small>	Size M€ (instrument)	Work Program Acronym - Section	Argumentation
1. Secure data exchange and access to build trust.	1.5 -2 (1 CSA)	MG - Logistics	One of the major barriers preventing stakeholders to enter in automated data exchange in B2B and B2Platforms interaction concerns data confidentiality and unauthorized intrusion and usage, specially of sensitive (commercial) data. This could be implemented in collaboration with all Transport ETPs. See topic: Efficient and sustainable supply chains through seamless data exchange across modes and transport users
3. Logistics in the full circular economy: New business models for horizontal and vertical collaboration.	3-5 (RIA) 1-2 (CSA)	CIRC	Logistics is a key enabler to ensure sustainability of circular economy by providing smart and sustainable logistics networks and services. This requires to develop new business models, including bundled services, after-market and reverse supply chains, addressed with an integral approach not only in the geographical sense (urban versus rural and combined) but also integration of end-to-end supply chain processes addressing scarce resources management.
7. An adaptive synchromodal European freight network strategy	3-5 (RIA)	MG - Logistics	Accelerate the creation of a smart and sustainable synchromodal freight network strategy on top of TEN-T infrastructure. Pull together current hub and corridor developments into one coherent framework serving the manufacturing and logistics industry as final users. <i>Note that ERTRAC has a similar recommendation.</i>
6. Synchromodal Hubs collaborative processes empowered by digitalization	1-2 (CSA) 3-5 (RIA)	MG - Infrastructure	Leveraging the potential of inland hubs, through innovative ICT and Digitalization (<i>e.g. apps or information brokers</i>) to create a Truly Integrated European Transport Network.
20. Physical Internet business cases demonstration.	8-10 (RIA or IA)	MG - All	Speed up the process and transition towards the new physical internet paradigm demonstrating how different technologies, business use cases and standards come together in real-world applications delivering value to its users and positive impacts in terms of emissions and energy consumption towards a truly integrated transport system for sustainable and efficient logistics.
9. Integration of information systems for cargo, transport and traffic.	5-7 (RIA)	MG - ITS	Overcoming fragmentation of information and systems between 3 silos - cargo information, service information and traffic information.



25. Improving the link between urban and long distance freight transport services and infrastructures.	3-5 (RIA)	MG – Urban Mobility	Exploration of new delivery models where connected hubs at different levels are shared by different retailers/suppliers to enter the city, and green vehicles and soft modes are used for the last mile.
19. Connected services for horizontal collaboration (RIA) & 18. Horizontal Collaboration Cases and Best Practices (CSA)	3-5 (RIA) 1-2 (CSA)	MG - Logistics	For the RIA: The main goal of this topic is to prove the viability of the concept where the groups of horizontally collaborating shippers are connected to collaborating transport providers via systems including standardized and transparent (legal) frameworks for participants to enter and exit in efficient combinations of collaborating networks. For the CSA: Boosting horizontal collaboration through identification and promotion of best practices.
16. Internet of Things large scale pilots in the field of logistics.	10-15 (IA)	IoT	The challenge is to leverage the value of the Internet of Things as one of the key enablers to realize a truly integrated transport system and the Physical Internet. Pilots covering the whole value chain and addressing the following topics : Circular economy: New business models for horizontal and vertical collaboration , Integration of information from cargo, transport and traffic , System of systems for self-organized logistics and Logistics operations automation .
5. Scenarios for logistics developments.	2-3 (RIA)	MG - socio-economic	Understand how trends, policies and technologies may impact freight transport and logistics operation and therefore socio-economic aspects such as environment, energy, safety and security, employment and growth.
11. Sustainable Integration of new manufacturing developments: Industry 4.0 in agile supply and logistics networks.	3-5 (RIA) 1-2 (CSA)	NMBP or FoF	Industry 4.0 is impacting supply and logistics chains. The challenge is to define business models and demonstration cases to develop and adapt new functionality of the logistics system to take the full potential out of the new production models in a sustainable way towards future supply chains
13. Collaborative Data analytics for logistics and supply networks.	3-5 (IA) 1-2 (CSA)	ICT - Big Data	Leverage the potential of data analytics to increase supply networks performance, resiliency, improved forecasting and planning flexibility, reduction of inventory and identifying bundling opportunities increasing load factors and asset utilization.
27. Bringing Logistics into urban planning.	3-5 (IA)	MG – Urban Mobility	Today, a general transport infrastructure plan for both people and logistics is missing in the city plan. It is necessary to define conditions towards proper consideration of urban logistics infrastructure needs and urban design aspects in Sustainable Urban Logistics Plans integrated in overall mobility plans. In collaboration with Urban Mobility Group ERTRAC. See topic: Combining services and networks for moving goods and people.
23. Integrated data framework and Big Data analytics assisting decision-making in urban freight transport	3-5 (RIA)	ICT – Big Data	Smarter and holistic data collection and management need to be taken in proper consideration according to two perspectives, jointly affecting decision-making and overall efficiency of the urban transport system: business outlook and freight mobility planning / network management.

In the following table, a compilation of all topics in the implementación plan and the prioritization at this stage is included.

Table 1 ALICE Implementation plan topics relevance to ALICE roadmaps.

Identified topics to be addressed in ALICE implementation plan, priority	Relevant Roadmaps addressed				
	1	2	3	4	5
1. <i>Secure data exchange and access to build trust. Very High Priority</i>	✓	✓	✓	✓	✓
2. <i>Effective trade facilitation. Medium Priority</i>	✓				
3. <i>Logistics in the full circular economy: New business models for horizontal and vertical collaboration Very High Priority</i>	✓			✓	✓
4. <i>Effective assessment and management of the triple-bottom line (People, Planet and Profit) logistics performance. High Priority</i>	✓				
5. <i>Scenarios for logistics developments. Very High Priority</i>	✓	✓	✓	✓	✓
6. <i>Synchromodal Hubs collaborative processes empowered by digitalization. Very High Priority</i>		✓	✓	✓	
7. <i>An adaptive synchromodal European freight network strategy. Very High Priority</i>		✓			
8. <i>Development of a Synchromodal Network of Networks. High Priority</i>		✓	✓		
9. <i>Integration of information systems for cargo, transport and traffic. Very High Priority</i>		✓	✓		
10. <i>Green logistics networks: Carbon and Beyond. High Priority</i>	✓	✓			
11. <i>Sustainable Integration of new manufacturing developments: Industry 4.0 in agile supply and logistics networks. Very High Priority</i>			✓	✓	
12. <i>Open system of systems for self-organizing logistics. High Priority</i>			✓		
13. <i>Collaborative data analytics for logistics and supply networks. Very High Priority</i>			✓		
14. <i>Affordable Cooperative Intelligent Transport Systems (C-ITS) solutions for end to end logistics applications. High Priority</i>		✓	✓		
15. <i>Logistics operations automation: The Matrix for Logistics. High Priority</i>		✓	✓		
16. <i>Internet of Things (IoT) large scale pilots in the field of logistics. Very High Priority</i>		✓	✓	✓	
17. <i>Development of a strategic European industry supply network design towards TEN-M (Manufacturing). Medium Priority</i>		✓		✓	

18. <i>Horizontal collaboration cases and best practices.</i> Very High Priority		✓		✓	
19. <i>Connected services for horizontal collaboration.</i> Very High Priority			✓	✓	
20. <i>Physical Internet business cases demonstration.</i> Very High Priority	✓	✓	✓	✓	✓
21. <i>Mapping models, roles, behaviours and coordination for migrating to Physical Internet.</i> Medium Priority	✓	✓	✓	✓	✓
22. <i>Business role of SME's and (end) customers in the Physical Internet</i> Medium Priority	✓	✓	✓	✓	✓
23. <i>Integrated data framework and Big Data analytics assisting decision-making in urban freight transport.</i> Very High Priority			✓		✓
24. <i>Exploring new opportunities for achieving effective integration of urban freight and personal mobility services and networks.</i> High Priority					✓
25. <i>Improving the link between urban and long distance freight transport services and infrastructures.</i> Very High Priority		✓			✓
26. <i>New business models for logistics services based on disruptive sharing economy.</i> Medium Priority					✓
27. <i>Bringing Logistics into urban planning.</i> Very High Priority					✓
28. <i>Interoperable standard modular urban loading units operation in the urban context: autonomous deliveries.</i> Medium Priority		✓	✓		✓
29. <i>Safety and security in urban freight.</i> Medium Priority					✓

 Main Roadmaps addressed;
  Other Roadmaps addressed

The topics are described in more detail below. Full description of the topics can be found in ALICE Implementation Plan for the Roadmaps.

1. Secure data exchange and access to build trust

Challenge: One of the major barriers preventing stakeholders to enter in automated data exchange in B2B and B2Platform interaction concerns data confidentiality and unauthorized intrusion and usage, specially of sensitive (commercial) data. The challenge is to ensure the *'trusted'* and *'seamless'* access for supply chain stakeholders. Projects should focus on ensuring **data exchange and access in a secure, controllable and trusted way** by stakeholders but at the same time, providing **easy many to many connectivity, facilitating generic data exchange**. It also requires that supply chain data and information is visible and standardised on an international scale.

Outcome:

- **Mapping and addressing real issues and barriers** preventing data sharing and exchange on top of privacy, security and trust such as behavioural aspects and perception on sharing data and associated business models.
- **Provide safe and secure access to supply chain information.** The scope covers B2G, G2G, B2B, B2Platform and B2C information flows including reverse flow of information in order to accompany truly closed loop supply chains reducing administrative burden.
- Provide an **international governance structure, including legislative issues and standardisation** in order to ensure the development and implementation of seamless and trusted mechanisms. This includes B2G, G2G, B2B, B2Platform and B2C exchange of information in order to ensure common governance throughout the EU (and beyond).
- **Facilitate sustainable and secure data networks enabling new business models to emerge.** This means designing and testing of these data networks and preparation of demonstrations in practical applications. It should be taken into account that new networks need certification to ensure trust between users.

Impacts & Targets:

- Clear path to secure and trusted digital supply chains resulting in reducing risk, loss and damages.
- Reduced total costs in seamless supply chains.
- Increased efficiency and sustainability in supply chains.

2. Effective trade facilitation

Challenge: The challenge is to improve interaction between business and border agencies. Based on the experience of ongoing, such as CORE, and previous projects in the area the ultimate goal is to **smooth supply chain flows across borders (all modes) and identify innovative approaches and processes to comply with regulation in a more seamless way**. The topic should build on the Digital Transport and Logistics Forum launched by DG MOVE and the actions included there to move current paradigm to e-freight implementation. The scope should be broader in order to capture not only customs' benefits but also the incentives of businesses involved in cross-border trade.

Outcome:

- **To propose harmonized AEO auditing schemes in Europe.**

- **To develop tools to store and maintain track of compliance of operators in a rated list** (compared to credit rating). As part of this compliance tracking, there is a need to understand and explore what sanctions need to be applied and how to apply them.
- **To identify and address hinders and barriers of simplified procedures.** A potential study could explore how heterogeneously trade facilitation procedures are being applied by customs administrations, how they impact the supply chain business, ending with recommendations/best practices. The study should lead to discover and quantify the impacts of the simplified procedures.

Impacts & Targets:

- Societal security.
- Faster customs clearance implies improved customer satisfaction, products availability and multiple savings for different stakeholders in supply chains.
- Total supply chain costs, especially considering delays at the borders, may be significantly reduced

3. Logistics in the full circular economy: New business models for horizontal and vertical collaboration

Challenge: Logistics is a key enabler to ensure sustainability of circular economy by providing smart and sustainable logistics networks and services. This requires to **develop new business models, including bundled services, after-market and reverse supply chains**, addressed with an integral approach not only in the **geographical sense** (urban versus rural and combined) but also integration of **end-to-end supply chain processes addressing scarce resources management**. The challenge is to integrate supply networks, including the reverse part of the chains, to make full utilization of resources within and across supply chains. This also requires the integration and adaptation of supporting supply chain tools.

Outcome:

- **New (business) models and use cases** demonstrating a substantial increase of supply network efficiency and sustainability of **direct and reverse flows management**, that currently are operated separately but could be integrated seamlessly. Determine costs and economic values of such integration and collaboration.
- **Overcome regulation barriers and definition of incentive schemes** for sustainable businesses cases in the circular economy.
- **Demonstrators** of hub operations, transport, packaging systems, containerization, handling technologies management, monitoring and tracing of resources throughout supply cycles for direct and reverse flows integration.
- **Better understanding of relationships within and across sectorial supply chains**, identification of material flows, and barriers and opportunities for synergies in the circular economy paradigm.
- **Measure the impact of logistics in the sustainability of circular economy in supply cycles.** Measuring and modelling the logistics performance of different circular economy value chains. Building on existing research on indicators, this requires new sets of widely supported KPI's especially addressing rebound effects, and recognised labelling and certification in value chains.

Impacts & Targets:

- Energy efficiency gains by 20%
- Reduction of environmental impact and continuous reintegration of resources by 20%
- Reduction of logistics costs thanks to opportunities of synergic flows by 20%
- Saving resources and materials thanks to reusing and recycling strategies by 30%
- Increase asset availability and quality. Upscaling of existing circular economy approaches by providing standardised logistics systems
- (real time) transparency on freight flows and demand
- Increasing customer and market acceptance of more circular business models.

4. **Effective assessment and management of the triple-bottom line (People, Planet and Profit) logistics performance**

Challenge: Provide a broadly agreed framework to calculate, report and improve of logistics operations and networks based on the triple-bottom line performance (people, planet and profit). This means addressing energy use and emissions (including air pollutants and noise with CO₂ equivalent), socio-economic factors (accidents, fatalities) alongside the traditional logistics KPIs that quantify costs, service performance and effectiveness.

Outcome:

- **Develop mechanisms to include other environmental impacts of transport** (not only CO₂), such as noise, black carbon and other pollutants into environmental performance assessment of logistics (if not already achieved by that point) as well as other socio economic factors;
- **Finalise the eco-label design and implementation**, alongside the widespread, detailed industrial testing of the recommended data collection, calculation, reporting and certification processes including certification governance;
- **Test and then promote widespread application of the accounting standard and eco-label scheme in industrial practice** (e.g. within existing management systems as part of a continuous improvement cycle) and policy design to prove its potential contribution to the identification of environmental improvement opportunities that can be incorporated into transport and logistics planning alongside traditional metrics related to cost, quality, safety, etc.;
- **Development of a continuous improvement process** that allows users of the approach to identify areas for improvement and which supports the drive to change;

Impacts & Targets:

- Reduced energy consumption (kWh Logistics/GDP)
- Increased renewable energy sources share.
- Reduced CO₂ Emissions (kg CO₂/tKm)

5. Scenarios for logistics developments

Challenge: A number of policies, socio-economic trends, new and developing technologies are seen as main influencers and potential game changers for certain logistics operations and/or logistics as a whole. The challenge is to **understand how trends, policies and technologies may impact logistics operation and therefore socio-economic aspects such as environment, energy, safety and security, employment and growth**. Projects are expected to identify and assess possible scenarios as well as to build modelling and simulation tools with that purpose.

Outcome:

- **Develop modelling and simulation tools** allowing during and after the project to 1) create different potential scenarios depending on the evolution of the trends, technologies and policies, including cross relation between the different aspects considered and 2) assess the expected socio-economic impact according to those scenarios and considering potential disruptions
- **Simulation of the scenarios** developed by means of modeling tools.
- **Develop recommendations and guidelines** according to analysis of scenarios for governments, industry and other stakeholder groups. Special attention should be given to business models and the opportunity to create socially safer and more secure jobs within the transport business.

Impacts & Targets:

- The project is expected to contribute to logistics scenario building to make optimal utilization of the opportunities of trends, policies and technologies in order to maximize the positive socio-economic impact.

6. Synchromodal Hubs collaborative processes empowered by digitalization

Challenge: **Leveraging the potential of hubs**, in particular inland hubs, **through innovative ICT and Digitalization** (e.g. apps or information brokers). Developing ICT architectures and customized solutions enabling collaboration among different stakeholders and ensuring confidentiality based on common business rules. Providing consistent hub applications and transport applications in terms of data governance and technology standards. Improving service quality of multimodal freight hubs with improved data quality and availability following the example of Port Community Systems.

Outcome:

- **Open, service-oriented ICT architectures for hubs.**
- Improved **collaboration among all stakeholders**, including better access of SMEs to the logistics market through an easy and secure access to information.
- New hub-specific functionalities, like **waiting and handling time prediction, incident management, pre-notification, slots management and workflow management**.
- Shared **situational awareness** through enhanced reality applications allowing real time disruption management.
- **Smart synchromodal hubs** enabling dynamic flexibility at the shipper's end, allowing each node to reallocate materials (shipments) in terms of time (reliability, speed) and space (location).

- Contracting arrangements from public to private actors for the usage of shipment, carrier and loading unit data for optimization of processes.

Impacts & Targets:

- Decrease of terminal transport and inventory costs, increased flexibility and resilience of the transport system, and a higher percentage of synchromodal flows,
- Optimization of utilization of resources (available infrastructure, equipment, human resources, etc.),
- Interoperability with existing systems of hubs enabling multimodality,
- Verified business models and collaboration rules as well as data and solution ownership,
- Creation of a blueprint concept of a hub with generic ICT requirements framework

7. An adaptive synchromodal European freight network strategy

Challenge: Achieving an adaptive multimodal European freight infrastructure network of networks defining a public/private roadmap for action, including public investments and policies. **Develop the framework conditions for a European freight network that is transparent, robust and resilient to traffic incidents, geopolitical changes and other external factors like climate change.** Network analyses and optimization to nominate key inland freight hubs and service corridors of European importance and introduce a network strategy to allow Pan-European traffic by all modes of transport. Pull together current hub and corridor developments into one coherent framework serving the manufacturing and logistics industry.

Outcome:

- A **strategy for synchromodal European freight network integrating core and comprehensive networks**, including inland waterways network and city networks. Creation of a blueprint concept of a network with generic organisational, technological and infrastructural requirements framework.
- **Alignment of innovative technologies** supporting different processes along the network e.g. mode-free planning, booking and trip management.
- Research on flow development, shipment preferences and transport customer choice behaviour including definition of **synchromodal KPIs**. Develop a booking system for multimodal transport on top of TEN-T Corridors.
- **Guidance for the development of the TEN-T for freight transport in connection to global corridors** (e.g. China's One Belt) considering the core network for long distances and Comprehensive network for last-mile access.

Impacts & Targets:

- Decrease of transport and inventory costs, increased flexibility and resilience of the transport system, and a higher percentage of synchromodal flows.
- Optimization of utilization of resources (available infrastructure, services, equipment, human resources, etc.)
- Additional impacts on greening of transport through modal shift away from road transport.

8. Development of a Synchromodal Network of Networks

Challenge: While the previous topic is more directed to policy makers and infrastructure managers in order to define appropriate strategy for public infrastructure management and development, this topic is targeting synchromodal operators and hubs to **develop synchromodality and enlarging current synchromodal networks** by improving and developing (new) **business models**. Visualize and demonstrate the potential of creating a network of synchromodal networks in Europe. Demonstrate overall business model, including the governance and operational model that would make it sustainable. Propose a roadmap for transition to the future situation.

Outcome:

- **New business models to deliver transport services between different hubs** with (almost) full asset utilization of different transport modes.
- **Expansion of synchromodal services** towards continental freight transport for all sectors and all goods, including pallet cargo of the manufacturing and retail industries and bulk cargo.
- **Demonstration and pilots of collaborative-multi-stakeholders synchromodal networks** to achieve end-to-end efficient, sustainable and effective logistics solutions.
- **Identify and create new added value** within the logistics network(s) with the aim to enable smooth **transition to the Physical Internet** and support the necessary **change management**.

Impacts & Targets:

- Achieve overall 70 % load factors in synchromodal operations and 15% increase on modal shift.
- Reduction of energy consumption and CO₂ emissions by 20% transport operations
- Increased efficiency and effectiveness of infrastructure use.

9. Integration of information systems for cargo, transport and traffic

Challenge: **Overcoming fragmentation of information and systems between 3 silos - cargo information, service information and traffic information.** Achieving technological and organisational integration of information as well as between public and private actors allowing visibility and transparency in the supply chain. Appropriate business models and mind shift of transportation providers, LSPs and shippers together, towards more integrated and connected logistics allowing to achieve exchange of loads across service providers, transport modes and networks.

Outcome:

- Creation of an interoperable environment for a collaborative network with generic organisational, technological and infrastructural requirements for **cargo, transport and traffic system integration**:
 - **Technological Integration** between platforms through interfaces based on data structure standards,
 - **Organizational Integration** through identification of legal and administrative barriers and recommendations on how to reduce them, trust building and introduction of business models and collaboration rules,
 - Integration between **Public and Private Actors/Information**.

- **Trust-building** for **collaborative IT systems** between **shippers, service providers, carriers and infrastructure providers/traffic managers** allowing dynamic planning and booking of freight services. *(in coordination with topic Nr. 1)*
- Verification of **business models and collaboration rules**.

Impacts & Targets:

- Increased flexibility and resilience of the transport system, and a higher percentage of synchromodal flows.
- Optimization of utilization of resources (available infrastructure, services, equipment, human resources, etc.).

10. Green logistics networks: Carbon and Beyond

Challenge: Adopt **systemic approach for Green Logistics**, extending the design of **green hubs and corridors into green networks** able to support the achievement of **EU sustainability goals** and favouring the coordination among transport corridors and enabling the interoperability among smart logistics networks. Establish standardised **multi-Criteria evaluation methodologies (including cost analysis)** for ex-ante and ex-post evaluation towards the establishment of virtuous circle of Green Certification for Companies and Consumers' increased awareness, exploiting IoT potential as complementary to topics 4, 6, 8 and 9.

Outcome:

- Development of required network performance (green hubs and corridors) measured through standardised KPIs to achieve sustainability objectives.
- Development of system-based energy optimization for logistics, possibly including reverse flows / circularity from a PI perspective.
- Hubs re-design requirements as linking hinge in a EU logistics system greening strategy.
- New business models for achieving green logistics.
- Education for all supply chain actors to increase better use of assets and Consumer awareness.

Impacts & Targets:

- Reduction of Energy consumption (kWh Logistics/GDP)
- Reduction of CO2 Emissions (kg CO2/tKm)

11. Sustainable Integration of new manufacturing developments: Industry 4.0 in supply and logistics networks

Challenge: Industry 4.0 is impacting supply and logistics chains. The challenge is to define **business models and demonstration cases** to develop and adapt **new functionality of the logistics system** to take the **full potential** out of the **new production models** in a **sustainable** way. Dematerialization and additive manufacturing, mass customization, on-site production, agile, cloud- and IoT-based manufacturing or manufacturing farms and associated services like quality controls, assembly and spare part management

will affect the way products are produced, transported, stored and distributed hence impacting transport and logistics demands in terms of volume and new service requirements.

Outcome:

- **Evaluation of potential impact of manufacturing and Industry 4.0 innovations on transportation and logistics:** business and operational models, logistics and transportation process, cost-benefit and how to prepare the business environment to cope with these changes.
- **New value-adding services and expected roll out,** e.g. concepts for manufacturing farms/clusters, dematerialization and new value added services: quality control, assembly, spare part management in industry 4.0 paradigm.
- Agile Network of Factories of the Future: **Demonstration actions and pilots on new logistics services and systems enhancing industry 4.0.**
- Synchronization of end-to-end supply chains to real customer/consumer needs, by **merging Physical Internet and Manufacturing 4.0**

Impacts & Targets:

- Increase of product availability and customer satisfaction.
- Reduction of transportation cost, energy consumption and GHG emissions by creating more efficient networks of manufacturing and logistics
- Decoupling growth of Transport from GDP

12. Open system of systems for self-organizing logistics

Challenge: Logistics services and resources are more and more openly available and accessible by the users through market places, booking platforms and other online resources. The challenge is to **get end to end solutions for a specific transport/logistics demand**. Therefore, emerging architecture of intelligent, complex systems should be used in supply and logistics to enable **emerging behaviour in self-organizing logistics** (i.e. logistics systems providing solutions for a certain need or demand). These emerging architectures should support privacy, commercial sensitivity, liability, and (compliance) legislation. Interoperability is a basic feature of the architectures, enabling organizations to register, connect and be able to perform business.

Outcome:

- **Self-learning, self-adjustable and self-organizing systems for supply chain composition** based on available services, including a new broad range of connected devices, hardware and software.
- **Impact analysis on organizational aspect, governance, business continuity, value models and mind shift of the supply chain planners.**

Impacts & Targets:

- Optimizing resource utilization: load factor, assets, contribution to reduction of infrastructure – and hub congestions, etc.
- Reducing customer supply time.
- Increase flexibility and agility contributing to resiliency.

13. Collaborative data analytics for logistics and supply networks

Challenge: Leverage the potential of data analytics to increase supply networks performance, resiliency, improved forecasting and planning flexibility, reduction of inventory and identifying bundling opportunities increasing load factors and asset utilization. The challenge is to **realize opportunities in terms of efficiency, energy utilization and emissions in the area of logistics related to big data.**

Outcome:

- **Applying (existing) data analytics algorithms for pattern detection.** It should result in **multi-tier collaboration in open supply – and logistics networks.**
- **Machine learning, predictive analytics and pattern recognition/detection applications** based on all relevant data. Downstream predictive analytics data for upstream optimization in the supply chain.
- **Demonstration of environment and supporting facilities for proof-of-concepts.** Address aspects like trust and data governance. Investigate any potential barriers and triggers for change.

Impacts & Targets:

- Reduced energy consumption (kWh Logistics/GDP)
- Reduced CO2 Emissions (kg CO2/tKm)
- Reduced total supply chain costs

14. Affordable Collaborative Intelligent Transport Systems solutions (C-ITS) for end to end logistics applications

Challenge: Leverage C-ITS potential for end to end logistics applications including real time optimisation of delivery schedules and routes, corridors and hubs management reducing empty trips, waiting time in terminals, optimizing transport (e.g. thanks to automation), ensuring integrity of the cargo and protection against damage and theft. Develop and showcase viable innovative (shared) business models in order to incorporate the while taking into account the specific needs of the logistics sector.

Outcome:

- **Develop and demonstrate C-ITS applications and business cases for logistics**, including **corridors management**, end-to-end, first and last mile delivery, trucks platooning, **transportation routing optimization, delivery execution, and terminals management:** loading and unloading reducing the waiting time in terminals.
- **Measure performance, impact and potential of deployment** of the tested business cases through specific quality indicators.
- Build on the ITS directive (2010/40/EU), **identifying good practices and lessons learnt** potentially transferred from the transportation of people to the transportation of goods.

Impacts and expected Targets:

- Increase energy efficiency by 10 % and increase traffic safety.

- Minimize waiting time in terminals increasing at the same time management capacity of terminals with already available infrastructure.
- Demonstrate business cases achieving an increase in load factors from 50 to 70 % and reducing empty trips by 20 %.

15. Logistics operations automation: The Matrix for Logistics

Challenge: Show the value of consistent, low cost, sustainable, collaborative, dependable, reliable, scalable, flexible and **automated supply chain (physical) operations** based on developments in the area of robotics, drones, augmented and/or mixed reality, autonomous transport, modular packaging and comprehensive automation.

Outcome:

- **Demonstration of improved performance in real human-machine cooperative systems** for applications and **use cases development** in transport automation, transshipment, last-mile deliveries, port and airport operations, terminals connection to warehouses and hubs, warehouse movements and operations, inbound to manufacturing lines, etc. Explore modularity as an enabler.
- **Novel business and financial models** including a **roadmap and plan for broad deployment** identifying small initiatives and realizable projects but should fit together contributing to this end. **Feasibility study** of how current infrastructure can be used as an (basic) asset to deploy automated supply chain operations.
- **Socio economic and legal aspects** including, human-robotics environments user acceptance, employment and new skills required. Develop a socio-economic impact analysis.

Impacts & Targets:

- Reduce transshipment costs promoting co-modality and multimodality.
- Faster and more efficient goods and container consolidation and de-consolidation.
- Recommendations for regulatory and legal changes to realize fully automated and autonomous logistics operations.

16. IoT large scale pilots in the field of logistics

Challenge: Logistics is a domain that can truly benefit by an interconnected world, addressing issues such as goods shortage, overstocking and perishable goods management. IoT is an enabling technology that has been incorporated in a limited set of applications and scale in logistics systems and supply networks. The challenge is to **leverage the value of The Internet of Things as one of the key enablers to realise the vision of the Physical Internet** (i.e. Distribution of functions among objects in the PI).

Outcome:

- **Large scale pilots of IoT in logistics**, covering the whole value chain and addressing the following topics among others:
 - Logistics in the full circular economy: New business models for horizontal and vertical collaboration.
 - Integration of information from cargo, transport and traffic for enhanced efficiency and sustainability.

- System of systems for self-organized logistics.
- Logistics operations automation.
- **Governance and business models** for the **operation of such networks with shared assets and shared information**. Security, privacy and trust between network partners.
- **Linkage of Physical Internet** concept and logistics with IoT existing initiatives: like the European Technology Platform on Smart Systems Integration (**EPoSS**), the IoT-Forum or the Alliance for Internet of Things Innovation (**AIOTI**).

Impacts & Targets:

- Decrease of (human) errors within the supply chains
- Increase asset utilization and load factors.
- Increase Supply Chain Visibility.
- Reduce cargo lost to theft or damage.

17. Development of a strategic European industry supply network design towards TEN-M (Manufacturing)

Challenge: **Strengthen the value of TEN-T** (corridors, hubs and associated transport services) **for manufacturing industry**. To that end, **Strategic Supply Network design based on demand and supply concentrations of European Manufacturing industries**. Supply chain infrastructures and services utilization might be close to optimal from an individual company's perspective, but considering aggregated supply and demand from many companies, many more opportunities for bundling, back loading, modal shift, increase in frequency of deliveries and smaller quantities etc. are opened up. **The challenge is to overcome and ensure shippers collaboration requirements to stablish the industry supply networks.**

Outcome:

- **A shipper industry-driven approach creating rationalized transport and logistics networks** benefitting from the intra-industry and public-private synergies of joint customer locations, conditions, load carriers etc.
- **Creating shared manufacturing services for late product differentiation/ customisation/ personalisation in existing open regional Logistics Hubs.**
- Assessment of current cost and footprint, and **demonstrated value of an optimized collaborative network in various scenarios of collaboration.**

Impacts & Targets:

- Increase of product availability through a smarter network and response time.
- Reduction of energy and GHG emissions by 30% increased load factor and 20% less physical transport.
- Supply chain costs are expected to decrease by 15-20% through optimal supply network use.

18. Horizontal collaboration cases and best practices

Challenge: Identification and analysis of **innovative business models and cases towards open and collaborative markets pursuing asset sharing and collaboration**. Specially identifying enablers and

barriers for those cases as well as the tools used to put them in place. Define paths and roadmaps for transferability and ample deployment after the success of CO3 and new market generated. Assessing human factors and organizational behaviours.

Outcome:

- **Best practices and business cases** should be identified, analysed and further exploited addressing shippers and logistics service providers.
- Advanced **business models for shipper's horizontal collaboration cases assessing different roles and governance**, as well as **legal** aspects.
- Advanced understanding of the **impact of human factors and organizational behaviours towards trust and adoption of open collaborative systems**.

Impacts & Targets:

- Increase asset utilization in the selected cases up to 80% load factor and achieve 15 % of modal shift.
- **Clear path for transferability and promotion of cases should be addressed**

19. Connected services for horizontal collaboration

Challenge: The main goal of this topic is to prove the viability of the concept where the groups of **horizontally collaborating shippers are connected to collaborating transport providers via systems** including standardised and transparent (legal) frameworks for participants to enter and exit in efficient combinations of collaborating networks. **Demonstrate how independent Control Towers** (coordination and management of networks of different supply chains) **and/or freight exchange platforms** could be linked, merged and/or work collaboratively to further exploit their potential.

Outcome:

- Interoperable systems that can be trusted as an **open platform of platforms to implement new collaborative business models** such as interconnected transport market places, control towers, booking systems, supply chain composition, etc. An increase in connectivity of different platforms already providing horizontal collaboration services and/or control towers is expected.
- **Motivation for different parties, minimum set of rules, regional differences etc.**, Stimulating behaviour of logistics decision makers in expanding networks as a tool that helps companies to increase their, and the whole supply network, efficiency and sustainability.
- **Frameworks and systems to connect different networks of horizontally collaborating shippers as well as collaborating transport providers**; these will serve as a big step towards PI.

Impacts:

- Transport routes of connected networks show a further 15- 20 % increase in load factors and decrease in supply chain cost.
- Energy use and GHG emissions are reduced with a further 20 %.

20. Physical Internet business cases demonstrations

Challenge: **Speed up the process and transition towards the new physical internet paradigm** demonstrating how different technologies, business use cases and standards come together to create the basis for deploying Physical Internet in real-world applications delivering value to its users and positive impacts in terms of emissions and energy consumption.

Outcome:

- Collect and analyse already running or established single projects/initiatives that could be seen as puzzle part of PI and **propose and implement business use cases of Physical Internet** to increase asset and energy utilization minimizing environmental impacts.
- Develop **novel business models** (including sharing policies) and their feasibility to be smoothly integrated into the existing logistics ecosystem **transitioning from current paradigm to Physical Internet one**. Roll-out and deployment strategies for the use case/s at European/Worldwide level.
- **Address socio-economic impacts, policy, regulatory and standardization recommendations** to speed up the process.

Impacts & Targets:

- Achieve overall 80 % load factors in the selected use cases and 20% modal shift.
- Reduction of energy consumption and CO2 emissions by 30% in the network.

21. Mapping models, roles, behaviours and coordination for migrating to PI

Challenge: **Strategy for the transition of the existing logistics service market into open configurable and collaborative networks of the Physical Internet.** Is this strategy supporting the business dynamics of tomorrow's supply chains?

Outcome:

- A proven **analytical economic model to evaluate the necessary investments of the different actors into Physical Internet**, that includes all possible streams of revenue and cost of utilized and shared resources.
- The appropriate **business model including governance and legal structures** for the Physical Internet.

Impacts:

- Stakeholders in open collaborative networks can calculate the economic effects on their business model
- Demonstration of the economic and environmental effect of the transition to PI for stakeholders.

22. Business role of SMEs and (end) customers in the PI

Challenge: **Develop, test and validate, through real life pilots, new business models for SMEs that can safeguard their agility and leanness in the Physical Internet paradigm.** The new business models definition shall include and address technology requirements, know-how and rules to participate in PI.

Outcome:

- **Pilots involving SME's as part of a diversified community/cluster formed by more actors of the PI**, demonstrating: (i) Cooperative organization and collaboration between big and small companies; (ii) Different approaches for different types of SMEs; (iii) Inclusive PI, involving companies of any size and geographical location.
- **Concrete examples of business models for SMEs** and their interacting partners, **demonstrating the advantages of participating in the establishment of PI.**

- Finding ways to reach SME's and communicate to them, the PI opportunity

Impacts:

- Business models, including requirements and roles, to make PI attractive not only for bigger companies but also for SMEs, so they can play an active and profitable role.
- Demonstration cases that PI will lead to cooperative organization and collaboration between big and small companies.
- Process innovations providing measurable benefits (benchmarks) for SME's on the marketplace (e.g., ROI, jobs creation).

23. Integrated data framework and Big Data analytics assisting decision-making in urban freight transport

Challenge: **Smarter and holistic data collection and management** need to be taken in proper consideration according to two perspectives, jointly affecting decision-making and overall efficiency of the urban transport system: **business outlook and freight mobility planning / network management**. Big data analytics will offer greater opportunities to **link freight operator's decision making with city planners decision making** (e.g. urban network planning) in order to achieve **resilient, optimised, sustainable and cost-effective governance of the city and more competitive position of business actors**.

Outcome:

- **Structured knowledge base on current applications of Big Data in urban freight transport.** Identification of good practices of value added applications of Big Data management and linked KPIs to elicit the potential and added value of such applications **to improve decision making in urban freight transport** (both private and public sectors);
- **Development and testing of evidence-based business cases**, achieving **positive impacts on energy use, environment and resilience of cities** in facing megatrends impacts (e.g. sharing economy – crowd-sourcing; social and demographic evolutions; e-commerce, etc.).
- **Roadmap of research to mitigate gaps between private & public decision-making** and improve the adoption of suitable methods. Incentive schemes will be supporting optimal and integrated use of big data in freight transport decision making for both private and public sectors.

Impacts & Targets:

- Better use of predictive analysis to achieve economies of scale in accessing data (accessibility of public sector to private data - lower cost than 20% - 30% and lower time);
- Faster development of big data program and regulation frameworks in public sector and reduced procurement time frame for the use of private big data;
- Resilient use of city transport network (optimal network capacity with increased use of 15-20%);
- Engage with the public sector to profit from potential collaboration / dialogue with private sector.

24. Exploring new opportunities for achieving effective integration of urban freight and personal mobility services and networks

Challenge: Further **exploitation of the potential of integration between urban freight and passengers transport systems and networks** is needed to optimize the use of the road, rail and inland waterways infrastructures in space and time, contribution to get healthier cities in terms of less traffic and congestion. This requires a change of paradigm towards a **freight/passenger integrated mobility planning** and explore more opportunities and new business **models for integration of urban freight with private or public transport at infrastructure and transport vehicle levels.**

Outcome:

- **Tools, methods and data sources** to identify and assess **opportunities of flows integration** and support the development of **integrated mobility plans.**
- **Evaluation of different measures for freight and passenger integration** and define **resilient governance models and incentives/enforcement system.** Evaluation in terms of environmental and social impact, level of traffic decongestion, job creation, economic impacts, through pilot testing at different type and size of cities is needed
- **New concepts and technologies contributing to a better integration of freight and passenger flows** including: IT, vehicle architecture, containers and logistics unit design and operation, transshipment and handling technologies.
- Development of **business models offering and extending mobility as a service (MaaS) to connect people and goods movements.**

Impacts & Targets:

- Increased use of assets and infrastructures by 10%
- Reduction of congestion and CO2 emissions by 15% through use of public transport network for freight deliveries.

25. Improving the link between urban and long distance freight transport services and infrastructures

Challenge: A major challenge to **reduce freight transport movements, congestion** and to increase the load factor in urban areas is the **optimization of the links between urban and long distance transport.** This suggest the exploration of **new delivery models where connected hubs at different levels are shared by different retailers/suppliers to enter the city, and green vehicles are used for the last mile.** A number of **soft barriers including business models and collaboration** need to be tackled to achieve a full realization.

Outcome:

- **Analytic models and tools for urban planners to decide on optimal location and size of connected urban hubs and transport means** taking into consideration current and future flow demand, demography, etc. for different city segments and scenarios.

- Pilot solutions for optimising the use of **Urban Consolidation Centers and micro platforms exploiting horizontal and vertical collaboration**, supported by IT solutions which enables visibility of flow data for all actors.
- Pilot and **evaluate different business and governance models** by defining roles and responsibilities for all actors, rules for hubs, ownership of the services and interactions between actors

Impacts & Targets:

- Increased use of assets and infrastructures by 30%.
- Reduction of congestion and CO2 emissions by 30% through optimization of traffic between hubs and urban areas, improvement of load factor and use of green vehicles.

26. New business models for logistics services based on sharing economy

Challenge: Consumers and other stakeholders are showing a strong interest in the sharing-based economy. Re-thinking the value of “ownership” and “use” is the new disruption, especially in urban logistics. There is the need to **find new approaches to unexplored potentials or emerging peer-to-peer (P2P) business / business – to – consumers (B2C) opportunities in freight market**, making them attractive and widely accepted. This lead to solutions to increase reliability, trust in transactions, higher investments and assets / payoffs sharing, in order to find new multi-stakeholders metrics for urban logistics sector sustainability.

Outcome:

- **Truly innovative, sustainable and long lasting forms of cooperation, business and social models for urban logistics services** (vehicles and fleet sharing and pooling, infrastructures and networks sharing) that are adequate to new market evolutions and trends.
- New **multi-actor assessment framework** able to evaluate safety, economic and financial sustainability, societal acceptance, operational efficiency, level of innovation, labour and environmental impacts.
- New **governance models and related marketplace rules** of the game - affecting all stakeholders – enabling a **win-win collaboration** able to remove barriers and eliminate any possible conflicts; instead, this models will encourage cross-sectorial cooperation among competing services and they will enable to capitalise previously underutilized assets.
- **Business-led roadmaps** ensuring a seamless and significant **market take up and roll out of collaborative meta-business models** in different frameworks with measures and incentives.

Impacts & Targets:

- Increased load factors (20%)
- Operational cost reduction (10-15%)
- Reduction of lead-time (5-10%)
- better infrastructures capacity use (better capacity 20%)

27. Bringing Logistics into urban planning

Challenge: Today, a general transport infrastructure plan for both people and logistics is missing in the city plan. It is necessary to **define conditions towards proper consideration of urban logistics**

infrastructure needs and urban design aspects in Sustainable Urban Logistics Plans integrated in overall mobility plans. The involvement of all key stakeholders: business actors, local administration and local politicians is crucial to achieve awareness and consensus on urban design decisions. Business models for building and operating facilities, how to get financial support and how to get greater efficiency in the management of the infrastructure are the main challenges of this topic.

Outcome:

- Recommendations on architectural design and **integration of logistic facilities in urban areas**, as well as the business models supporting them. This means understanding of how to best build and manage – in an optimal and resilient way – logistics city infrastructures (loading/unloading areas, consolidation centres, pick up points, warehouses, etc.) and urban design adequate for the (evolving) dynamics of urban delivery services.
- **Analytical economic models to support stakeholder analysis, balancing logistic efficiency and life quality.**
- **Large-scale demonstrators on logistics planning for urban city planners showing the impact of concepts, tools and innovations.**

Impacts & Targets:

- Increased use of assets and infrastructures by 20%.
- **Reduction of congestion and CO2 emissions by 20% through optimization of traffic and better vehicle utilisation.**

28. Interoperable standard modular loading units' operation in the urban context: autonomous deliveries

Challenge: **Modularization of logistic (smaller) units suggests similar benefits at urban level to those ISO-container has already demonstrated:** improved load factor and interoperability among different transport systems and modes, less logistics costs and handling times, more secure and safe cargo, etc. **Modular loading units used in the urban context will seek for interconnectivity, optimization and last mile cost efficiency.** However, these units need to be designed and tested for different urban scenarios and demonstrate the full advantages to industry and society. Additionally, it is necessary to pave the way towards a global standardisation to realize full benefits.

Outcome:

- **Development of modular urban load units compatible with regular containers and vehicles**, as well as new proposal for vehicle architectures and sizes compatible to urban load units (i.e. small van with capacity optimized for multiple or submultiple of palet-size/modular box).
- **Development of technologies to transfer standard loads between vehicles** (large and small) as well as with other transport modes at urban level. Enabling distributed self-control of objects through networks, as well as, cooperation and consolidation among various LSP and LSC.
- **Large scale pilot project** (including various business cases), together with an impact assessment (economical and environmental) will be demonstrated.

Impacts & Targets:

- Improvement of load factors and vehicle utilization by 15%

- Reduction of CO2 emission thanks to traffic reduction by 15%
- Reduction of handling costs and time in last mile operations thanks to standardization of load units and interoperability by 30%
- Increase safety and security of cargo by 30%

29. Safety and security in urban freight

Challenge: A significant number of goods is lost following security breaches specially in cities. It is therefore important to **identify solutions to guarantee a safe urban delivery system minimizing the risk for the freight operators and ensuring peoples' privacy and security at the same time**. Research efforts should be extended to systems enabling the **decoupling of the delivery and the collection of the goods** with efficient, reliable and safe solutions. Logistics providers, carriers and receivers need to work together in order to improve the security (mainly data and information, loss or damage of goods), the safety for workers (health) and the environment (dangerous goods) by introducing state-of-the-art technologies and further developments.

Outcome:

- **Efficient, reliable and safe solutions enabling the decoupling of the delivery and the collection of the goods.**
- Solutions to **improve security and safety** by assessing the potentials of improvements of **human machine interfaces**, policies, vehicles and information and ICT.
- Innovative solutions to ensure the **resiliency and robustness of urban freight systems**.
- **Impact assessment and roadmap** with mitigation measures to ensure safer and more secure urban mobility and logistics.

Impacts & Targets:

- Increased customer satisfaction by 30%
- Reductions of failed deliveries by 30%
- Reduction of cargo loss due to theft or damage by 30%
- Improvement of resilience and robustness of urban freight systems by 30%

Annex: Methodology on the preparation of ALICE Implementation Plan

Several workshops have been performed in order to gather input, ideas and build consensus among industry, research and policy makers on the topics included in this Implementation Plan following a bottom up approach. The process to prepare ALICE Implementation Plan has been developed in 4 phases:

Phase1: ALICE Working Groups small focussed workshops:

WG1. Sustainable Safe and Secure Supply Chains. Brussels, 30.10.2015 (15+ attendees)

WG2. Corridors, Hubs and Synchromodality. Rotterdam, 03.11.2015 (15+ attendees)

WG3. Information Systems for Interconnected Logistics. Berlin, 27.10.2015 (12 attendees)

WG4. Global Supply Networks Coordination and Collaboration. Brussels, 03.11.2015 (25+ attendees)

WG5. Urban Logistics. 26.01.2016 (25+ Attendees)

The sessions addressing the Implementation Plan (Agendas in the annexes) were structured in the following way:

- Short introduction of ALICE related roadmap and background.
- Individuals were given 10 Minutes to think 3 major issues/opportunities that should be worked on in projects.
- The major issues and opportunities were afterwards shared by the individuals and grouped in themes.
- Smaller groups of 3-4 people were appointed to work on each of the themes for 30 minutes to define:
 - o Title
 - o Identification of the problem and opportunity.
 - What needs to change and into what needs to change.
 - o Scope:
 - o Expected impact and expected results
- Smaller groups reported the outcomes to the whole group. The rapporteur was in charge to elaborate a draft after the meeting consolidating additional inputs from present and non-present members.
- In total, 38 topics were identified during the 5 workshops

Phase 2: ALICE Executive and Steering Group Sessions:

- The outcomes of the meetings and the identified topics were discussed with the members of the Executive and Steering Group in a meeting on the 15th of November 2015 in Brussels.
- SETRIS partners prepared a revised version of the topics to include Steering Group Comments and shared broadly with ALICE Members.
- As a result, some of the topics were combined and merged resulting in a list of 32 topics.

Phase 3: Consolidation of topics and broader discussion. Vienna Workshop.

- A major Workshop was organized in Vienna with more than 100 attendees.

- A survey was launched among workshop participants and prior to the workshop to prioritize topics to be discussed out of the 32 identified so far. The result served to structure the workshop, giving more time for discussion to those topics with higher priority.
- The 100 attendees were divided in groups of 12-14 people before the start of the workshop.
- Each of the groups participated in one of the 8 “corners”. In each corner one of the 28 prioritized topics was addressed. The following questions were addressed with input of each individual:
 - What are the key elements regarding this topic? (maximum 3)
 - What is missing (in your opinion).
 - What would you expect to get out of this as an outcome?
- The process was repeated 9 times, so we have 72 specific sessions. Some of the topics were discussed by different groups of people (up to 4) depending on the prioritization and voting.
- The organization of the workshop was evaluated very positively among participants as it allowed a lot of engagement and sharing of ideas.

Phase 4: Consolidation and finalization

- Setris partners consolidated the input received during the workshop in Vienna including a revision of the participants in the different workshops.
- The resulting description of the topics was broaden enormously, therefore the topics included a very well detailed and comprehensive identification of the challenges. See chapter 3.
- Moreover, additional topics were identified and other were merged resulting in a list of 30 topics.
- ALICE Executive Group proceed to an internal synthesis of the major aspects and challenges in the topics as included in chapter 2.
- A meeting of ALICE Mirror Group took place in July 2016, 6th and 7th in Milton Keynes were the topics were presented and discussed.
- A new round of comments was opened among ALICE members and the Mirror Group until the 15th of September.
- As a final stage of this analysis, the topics were presented in ALICE plenary meeting on the 14th of October and a prioritization process was developed.

As a result of the activities performed, 29 differentiated topics have been identified as the key logical steps in the implementation of ALICE Research and Innovation Roadmaps

- Sustainable Safe and Secure Supply Chains.
- Corridors, Hubs and Synchromodality.
- Information Systems for Interconnected Logistics.
- Global Supply Networks Coordination and Collaboration.
- Urban Logistics

Topics agreed and proposed by all transport ETPs

Strengthening European cross-modal Freight Transport Research and Innovation supporting innovation and deployment strategies

Motivation/Challenge:

SETRIS project has been the first project in which the various transport ETPs (i.e. ACARE, ALICE, ERRAC, ERTRAC and WATERBORNE) have worked together. As main achievements of the project, on top of creating a collaboration framework that triggers ETPs to meet, share and discuss, we could mention:

1. Building consensus at transport system level, creating a vision for the sector in regards to a Truly Integrated Transport System for Sustainable and Efficient logistics. Moreover, a Research Agenda and Implementation Plan will be delivered to achieve the vision.
2. Review and update the existing SRIAs for each of the transport ETPs within a multi-modal and integrated transport system framework defining comprehensive, credible and realistic implementation plans for each SRIAs in a coordinated framework of running ETPs;
3. Map and benchmark past and present research initiatives affecting the achievement of integrated transport SRIAs and market uptake;
4. Support, shape and contribute to future Transport Research Arena (TRA) events leading to a significant increment in the prominence of transport research and innovation activities.

A continuous effort is required from the different ETPs on following up the 4 topics/activities above. Moreover, a key strategic level pan-transport ETP progression enabled by SETRIS has been the agreement of proposed 6 “topics of common interest”. These are viewed by all as being so ‘generic’ as to relate to all transport ETPs when looking ahead to further ETP joint-working:

1. Competitiveness of a European integrated transport system
2. Decarbonization of transport holistic approach to identify sources and opportunities to meet targets
3. Information technology, new opportunities and threats e.g. cyber security, big data
4. New mobility systems concepts implementations
5. Mitigation of scenarios in which progress towards an integrated transport system being slower than expected
6. Resilience of the transport system.

The objective of this Coordination and Support Action is to continue building consensus, promote, and agree on cross modal freight transport research topics and agenda towards the truly integrated transport system, including specific targets and plan to be implemented in the period 2020-2030. The CSA will assist Transport ETPs: ACARE, ALICE, ERRAC, ERTRAC and WATERBORNE, the European Commission and Member States in defining the cross-modal strategies supporting the achievement of the targets identified in the transport White Paper, the Energy Union, the Digital Agenda and other European policies.

Scope and Content:

- Develop, promote and follow up implementation of cross modal freight transport research agenda addressing, among others, the topics identified above. Other topics maybe included as per agreement of the Transport ETPs, European Commission and Member States.
- Monitoring cross-modal, system and user centric freight transport research projects and their impacts regarding ETPs agendas and plans as well as regarding relevant European programmes (Horizon2020, ENT, JU, etc.) and organisation of workshops to present and discuss results, trends, exchange experience and foster innovation aspects.
- Identification of products, services and other value added results generated through research projects that achieved a market up-take. Identification of barriers for the deployment of research results and improvement of framework conditions. Identifying results or clustered results that could be tested and or deployed in TEN-T corridors
- Exchange of practices and experiences among ETPs in processes such as: methodologies for road-mapping, project and programs impacts analysis, engagement processes with Member States and Regions, key performance Indicators definition and consensus building.
- Develop appropriate frameworks for collaboration at different levels: EU, Member States and Regions.
- Support wide dissemination of project results by organising workshops around clusters of projects, special conference sessions, aiming broad knowledge sharing and awareness of the latest cross-modal developments by industry. Special attention and support will be given to TRA2020 and TRA2022 editions.

Expected Impacts:

This action will bring together the leading European stakeholders in freight transport cross-modal research to monitor projects, develop roadmaps, and support their implementation and market uptake. Specifically, the project should:

- Define a cross modal research agenda and implementation plan for freight fixing clear contributions to the achievement of the targets identified in the transport White Paper, the Energy Union, the Digital Agenda and other European relevant policies.
- Increase the efficiency of public and private investment in Freight Transport Research Activities across Europe. Specially, boosting appropriate complementarity of investments at different levels to avoid duplication, enhancing the framework conditions to increase market take-up of research projects closing the gap between research and implementation and accelerating time to market of new mobility solutions

Seamless Mobility through End to End mobility and data exchange

Motivation/Challenge:

Today an individual attempting to go from their home in one city to a destination in another city may have to interact with a local transport or taxi company, an inter-city train or airline, a local public transit

company or a rental car company, and a hotel. These interactions occur independent of one another and require the individual to book multiple “tickets” to achieve their travel objectives. It would be much more user friendly for the individual to select the various travel services they want and receive a single ticket that would be accepted by all the enterprises involved in the individual’s end-to-end travel plans. Unfortunately, while several online services provide users with access to various travel services, each service selection must be booked in the system of the individual service provider and an individual booking (“ticket”) managed by the traveller. This inconvenience results from the historical separation and systems development that has occurred in each of the various services being utilized by the traveller. Airlines, rail operators, local public transit operations, taxi operators, and hotel operators all have developed their booking systems without any conception of integration to one another. While several EU projects (WISETRIP, eMOTION, IMAGE, CRUMPET, WH@M, ADAMANT, EU-Spirit, IM@GINE-IT, All Ways Travelling) have examined the potential for establishing standards to create a “single ticket” concept for travel (CIVITAS objective), these standards have generally been ignored by industry. Commercial enterprises, such as Siemens (SIMobility Connect), are developing proprietary systems for achieving this end as are individual countries (Finland), but there are currently no truly open standards for achieving this objective.

Scope and Content:

An analysis of the various systems used by travel service operators is required to determine how information across services can be linked to enable an end-to-end approach to travel bookings. In addition, integrated payment concepts will need to be linked to a single ticket so that service providers can be paid for the portion of travel that they cover. How this is to be done needs to be examined. Based on the findings of these studies, standards for travel information, information flows and bookings should be developed so that industry participants and consumers can benefit from a seamless travel process. New business models (for integrators or current stakeholders should be explored) to create the appropriate framework for actors to collaborate while maintaining openness and ensuring transport security. Regulatory and legal framework (Liability) might be addressed as well.

Expected Impacts:

The project should deliver travel industry communications standards that enable the use by travellers of a “single ticket” for their journeys. In addition, mechanisms to ensure that each service provider is paid for their service will need to be developed. The implementation of a single ticket concept will benefit travellers by saving time and frustration in the travel planning activity. It will also benefit service operators by providing them increased exposure and higher customer satisfaction.

Efficient and sustainable supply chains through seamless data exchange across modes and transport users

Motivation/Challenge:

The current approach to the integration of businesses along a supply chain has changed little in the last 50 years. Enterprises wishing to communicate electronically with one another, whether via standard formats such as EDIFACT, ebXML, RossettaNet, RIS, TAF/TSI ANSI X.12, IATA industry data model and ACRIS etc. or customized/proprietary formats, must manually map each business partner’s message structure to each other’s internal business format. This mapping process is time consuming and costly. It



is also sufficiently technical in detail that many small businesses are precluded from fully integrating with their partners because of a lack of enough technical competence. Numerous EU projects have attempted or are attempting to address this problem: LogiCon, CASSANDRA, e-Freight, Finest, FISpace, e-Impact, CORE, AEOLIX or SELIS. Moreover, Digital Transport and Logistics Forum and the numerous “single window” projects have all had as their theme the development of technologies, semantics, ontologies and standards that would allow supply chain partners, particularly SMEs, to “seamlessly integrate” with one another. Additionally, C-ITS, e-freight, e-maritime, e-navigation and e-maritime EU developments are also relevant for this topic. Unfortunately, none of these projects/initiatives have garnered sufficient momentum to raise enough awareness and reach consensus in the whole transport and logistics industry to change the outdated approach to integration that currently characterizes the connection of partners in the supply chain. If true “plug and play” integration is to be achieved, another approach is required.

Scope and Content:

Another project focused on defining a set of semantic structures, an ontology for single mode logistics operations or new application programming interfaces is not needed. What is needed is a rational way to describe, in standardized terminology, the various artifacts, documents, and processes employed in all modes of transport and storage so that standards can be developed that allow organizations engaged in supply chain operations to communicate and share information, and that software companies (and educational institutions) can begin profitably building systems around. To accomplish this a detailed inventory of the terms, formats, protocols, etc. used by all players in a supply chain (from shippers to consumers, across modes and between commercial entities and governmental regulatory agencies) is needed. Moreover, detailed analysis of the outcomes of previous and ongoing research projects and potential of new technologies such as machine learning or block chain are needed in order to illustrate relevant case studies and business cases. Based on this inventory, a full supply chain (not only multi-modal, but also addressing logistics service providers, retailers and manufacturers) standard for communications and information sharing should be developed. Further analysis and viability of public and private investment implications of the different alternatives needs to be addressed. Moreover, legal barriers for cooperation should be assessed and incentives schemes for fast implementation proposed. Taking as an example the telecoms industry, such a standard would facilitate not only cross border communications, but also cross mode, container, user, and technology communications. Especially important is to achieve and build consensus on a general approach to solve this problem in industry, i.e. governance model and standard by involving and engaging with key stakeholders such as: GS1, WCO, UN/EDIFACT and representatives of all transport modes.

Expected Impacts:

By developing a truly international mode/operator/government/region/product independent standard supply chain participants could lower the time and money spent on mapping each other’s messages to an internal format. Such a standard would lower the barriers to participation currently existing in supply networks and facilitate not only seamless communications, but data acquisition, analysis and supply chain improvement (i.e. enhanced collaboration).