Roadmap "ICT for Sustainable Freight Transport and Logistics

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Purpose

- Provides strategic guidelines:
  - Future research and development activities in the ICT for transport logistics field,
- Ensuring the long-term sustainability
  - Environmental,
  - Economic and
  - Societal
- Contribute to the EU Research and Innovation
  - Common Strategic Framework (2013 – 2020)
Scope until 2030

- Identify challenges to be overcome by ICT for freight transport and logistics to increase the sustainability.

- How to overcome the challenges
  - research,
  - development and
  - pre-competitive deployment expected in key technological areas.
## Vision

<table>
<thead>
<tr>
<th>Policy objectives / Industry goals</th>
<th>Improvements by 2030</th>
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</thead>
<tbody>
<tr>
<td>Co-modal freight corridors.</td>
<td>30% of road freight over 300 km should shift to other modes such as rail or waterborne transport by 2030, and more than 50% by 2050, facilitated by efficient and green freight corridors.</td>
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<td>Zero-emissions urban logistics.</td>
<td>Achieve essentially CO2-free city logistics in major urban centres by 2030.</td>
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<td>Low-carbon freight transport services (business perspective)</td>
<td>Significant market-share for low-carbon services for environmentally concerned customers, taking into account emissions alongside price and speed of transport.</td>
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<td>Increased logistics efficiency</td>
<td>Holistic approach for supply chain, incl. All modes and all stakeholder</td>
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<td>European multimodal transport information, management and payment system.</td>
<td>Increased reliability of transport schedules by 50%, as measured by average time loss, (scheduled time vs. real travel time).</td>
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<td>End-to-end supply chain security</td>
<td>Make sure that the EU is a world leader in safety and security of transport in all modes of transport.</td>
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<td>Cooperative vehicles and infrastructures.</td>
<td>The large majority (80%) of vehicles and infrastructures will be cooperative, supporting safe and optimal utilization of transport infrastructures and improvement of driver’s behaviour.</td>
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</table>
Challenges: Co-Modal freight corridors

- **State-of-the art**
  - Little evidence that investments in EU research over the last 15 years has contributed to moving cargo from road to other transport modes
  - Rail transport has received 81% of the TEN-T budget of 400 billion Euro. Growth in freight on rail estimated to be approximately 10%

- **Improvements**
  - Many stakeholders need to cooperate efficiently ➔ Interoperability
  - Making the best possible use of the infrastructure
  - Need for new solutions that naturally chooses green alternatives
  - Making the best possible use of each vehicle moving in the infrastructure
Challenges: Co-Modal freight corridors

- Main ICT-related Challenges
  - Introduce an efficient Soft Infrastructure
  
  Common Framework

  - Introduce the concept of Corridor Management

  On top of ITS-TAF/TSI, RIS, and e-Maritime
Challenges: Zero Emission Urban Logistics

- **State-of-the art**
  - Urban transport is dominated by road transport
  - Rapid development in motor and car technologies
    - Battery (electrical vehicles), gas motors, hybride motors
  - The drivers are controlled by two different objectives
    - More efficient traffic (traffic management)
    - More efficient transport (freight distribution management)
  - Low loading factor

- **Improvements**
  - Harmonised control of vehicles taking into account both traffic management and freight distribution management
    - Increase in load factor
  - Utilisation of the shorter range for fully electrical vehicles

- **Main ICT – related challenges**
  - Connection of the vehicles and the road infrastructure
  - Interoperability between traffic management and freight distribution management systems
  - Connection of goods information and car information => Total set of information about cars transporting in urban areas
Challenges: Low-Carbon Freight transport services

- **State-of-the art**
  - Model shift solution
  - Brokerage services
  - Green deliveries

- **Improvements**
  - largest share of door-to-door freight transport services optimized for emissions reduction, well speed, reliability and price.

- **Main ICT – related challenges**
  - Standard indicators and methods for environmental performances of freight transport services
  - Multi-actor, multi-criteria freight transport planning
  - Cooperative environment for logistics information services
Challenges: European Multi-Modal transport information, management and payment system

- **State-of-the art**
  - Many platforms and interoperable solutions for information exchange
  - Trend towards better collaboration and information sharing in ecosystems
  - Existing standards for information exchange – Pan European projects for electronic invoicing, etc.
  - xRM for “Anything Relationship Management”
  - Cloud computing / Internet of Services / Internet of Things / Internet of Content - convergence

- **Improvements**
  - Adoption of technology
  - Logistics as dynamic ecosystems - More actors enrollment (communities, non-hierarchical networks)
  - New tools and services for intelligent data capturing, analysis and information sharing

- **Main ICT – related challenges**
  - Wireless Sensor networks adoption in Logistics industry - Integration of intelligent sensors
  - Cloud (Private/ Public) interoperability
  - Federated Open Platforms in Logistics – Services easily configured, discovered, composed and used by companies with different IT maturity levels
Challenges: End-to-End Security

- Credentialing of participants in the supply chain.
- Screening and validating of the contents of cargo being shipped.
- Advance notification of the contents to the destination country.
- Ensuring the security of cargo while in-transit via the use of locks and tamper-proof seals.
- Inspecting cargo on entry.

**State-of-the art**
- Tracking and tracing partly possible, SCM software available for some stakeholders
- Transport means identification
- Information gaps along the chain,
- Solutions for ICT security available

**Improvements**
- ITS: information and goods flows synchronous
- Web based information systems as prototypes available

**Main ICT – related challenges**
- Standards
- Different regulation
- Hardware/Software cost, maintenance
- Interconnection of different solutions
- Challenges reg. security and multi-modal
Challenges: Cooperative Vehicles and Infrastructures

- **State-of-the-art**
  - ITS services active road safety and traffic efficiency
  - Service networks for subscribing and publishing of goods information for all stakeholders
  - Mobile systems with real-time connection to infrastructure and goods

- **Improvements**

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<td>ITS services infrastructure</td>
<td>Traffic flow optimizations</td>
<td>Increased transport efficiency</td>
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<td>Lower cost due to fewer accidents and increased transport work.</td>
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<td>Fully developed and integrated service network</td>
<td>Accurate emission calculation based on actual transport work.</td>
<td>Possibilities for third party service providers to deliver services</td>
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<td>Linking transported goods with environmental impact</td>
<td>Reduced administration as part of total transport cost.</td>
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<td>Advanced mobile trucking systems</td>
<td>Improved routing through reduced erroneous driving and higher visibility.</td>
<td>Reduced time duration per transport</td>
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<td>Reduced administration.</td>
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- **Main ICT – related challenges**
  - Single technology testing and validation replaced by sub-system evaluation
  - Merge currently existing domains to enable information sharing, aiming towards openness.
  - Agreement on concepts, services and stakeholder involvement
  - Resolving the “Chicken-and-egg”-problem of ICT investments
Challenges: Increased Logistic Efficiency

- **State-of-the art**
  - Mode specific systems
  - Mode specific regulations
  - Inefficiency
  - Lack of seamless information flow

- **Improvements**
  - Shared infrastructure
  - SOA for better data exchange
  - Implementation of technologies

- **Main ICT – related challenges**
  - Standardization
  - Hardware/software related
# Contributors to the current version of the Roadmap

<table>
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<tr>
<th>Freight Corridors</th>
<th>A. Gehlhaar, T. Katsoulakos, <strong>J.T. Pedersen</strong></th>
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<td><strong>H. Westerheim</strong>, M. Huschebeck, Z. Jeftic</td>
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<td>R. Frindik and <strong>P. Paganelli</strong></td>
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<td><strong>K. Kalaboukas</strong>, T. Katsoulakos and J.T. Pedersen</td>
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<td><strong>End to end supply security</strong></td>
<td>G.R. Zomer, K. Kalaboukas (ICT), T. Katsoulakos, F. Knoors, P. Sonnabend, <strong>J. Baalsrud Hauge</strong>, N. Meyer-Larsen</td>
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<td><strong>Henrik Sternberg</strong>, Z. Jeftic,</td>
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<td><strong>Increased logistics efficiency</strong></td>
<td><strong>J. Schumacher</strong>, G.R. Zomer (only reviewing)**</td>
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Thank you for your contribution

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