European Commission

This fiche is part of the wider roadmap for cross-cutting KETs activities

'Cross-cutting KETs' activities bring together and integrate different KETs and reflect the interdisciplinary nature of technological development. They have the potential to lead to unforeseen advances and new markets, and are important contributors to new technological components or products.

The complete roadmap for cross-cutting KETs activities can be downloaded from:

http://ec.europa.eu/growth/industry/key-enabling-technologies/eu-actions/ro-ckets

Potential areas of industrial interest relevant for cross-cutting KETs in the Transport and Mobility domain

This innovation field is part of the wider roadmap for cross-cutting KETs activities developed within the framework of the RO-cKETs study. The roadmap for cross-cutting KETs activities identifies the potential innovation fields of industrial interest relevant for cross-cutting KETs in a broad range of industrial sectors relevant for the European economy.

The roadmap has been developed starting from actual market needs and industrial challenges in a broad range of industrial sectors relevant for the European economy. The roadmapping activity has focused on exploring potential innovation areas in terms of products, processes or services with respect to which the cross-fertilization between KETs can provide an added value, taking into account the main market drivers for each of those innovation areas as well as the societal and economic context in which they locate.

Taking the demand side as a starting point, cross-cutting KETs activities will in general include activities closer to market and applications. The study focused on identifying potential innovation areas of industrial interest implying Technology Readiness Levels of between 4 and 8.

T.4.2: Multimodal all cargo logistic chains and goods transport service

Scope:

To setup door-to-door, just-in-time and highly resource efficient lean logistic systems, serviced with streamlined multimodal chains that benefit from integrated information-based facilitators, specialized vehicles (as cargo vessels or airships) and highly dependable automated cargo and baggage handling systems, even to, or from, remote areas of Europe and the world.

Demand-side requirements (stemming from Societal Challenges) addressed:

- Tackle the "Smart, green and integrated transport" societal challenge
- Contribute to the achievement of the EU Transport 2050 strategy (COM/2011/0144 final) objective of a 60% reduction of CO_2 emissions from transports
- Deliver safer and less congested travel as well as smoother and quicker journeys, as requested for the Trans European Transport Network (TEN-T) policy (Regulation (EU) No 1315/2013 of the European Parliament and of the Council of 11 December 2013 and repealing Decision No 661/2010/EU Text with EEA relevance)
- Achieve SESAR 2020 objectives for the European Air Traffic management, as regards environment (emissions and local nuisances), safety and ability to efficiently cope with growing traffic volumes
- Continuously enhance safety and resistance/resilience of vehicle operation all along end-to-end transport chains
- Support the Smart Vehicle initiative of the i2010 strategic framework on the innovation society (COM(2005) 229 final)
- Ensure operational implementation of European international transport agreements (as TRACECA, SEETO and NDPTL)

Demand-side requirements (stemming from market needs) addressed:

- Reduce traffic management direct (fees for operators) and indirect (such as costs of jams on citizen health, economy competitiveness, environment, etc.) operational costs
- Reduce or maintain numbers and rates of accidents in Europe at an acceptable number, whatever traffic growth
- Enable new transportation services dealing with changing mobility and transportation needs, changing trade patterns, citizen request for affordable, timely, seamless and ubiquitous transport services
- Support integration of lean global logistic chains taking advantage of communication and tracking technologies for preventing incidents and offering in-trip services

Specific technical / industrial challenges (mainly resulting from gaps in technological capacities):

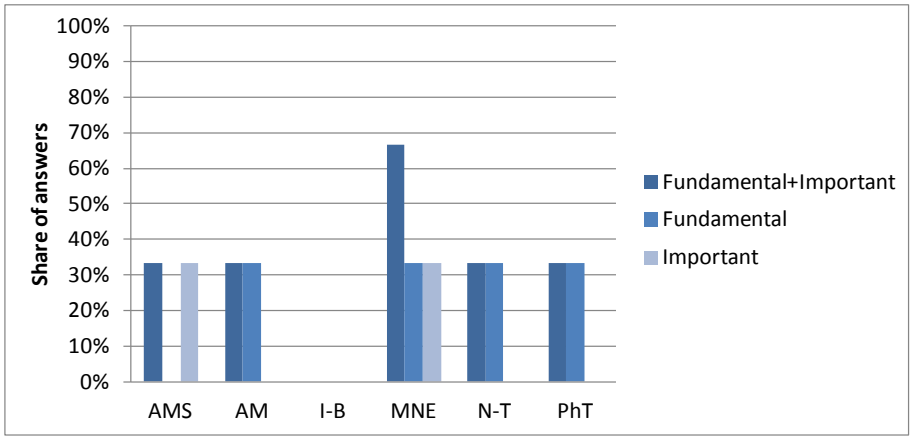
- Introduction of continued cargo (including luggage) tracking and based on indoor localization capability (relying on communication networks, wireless sensors, radio-frequency identification technology, etc.)
- Development of point to point heavy/large cargo transport means, with optimized ships and port infrastructure, high dependability airships or safe extra-large road transports
- Development of logistics planning tools supporting the integration of highly time-efficient and reliable end-to-end European supply chains
- Development of an integrated end-to-end logistic chain management system, dimensioned for end-to-end tracking of elements along the chain
- Development of logistics planning tools supporting the integrated monitoring of cargo movement along the supply chains
- Automation of luggage/cargo handling and lashing
- Increase of the adoption of unitized cargo containers along multimodal transport chains
- Ensure self-health monitoring / automated diagnostics of the system to trigger quick repair and guarantee high integrity of the system
- Enable dynamic, reliable and secure distribution of instructions down to any action / handling node of the chain
- Where security checks are mandatory, enable high-throughput and highly reliable check of luggage and cargo

Contribution by cross-cutting Key Enabling Technologies:

In respect to this Innovation Field, the integration of KETs could contribute to the set up of door-to-door, just-in-time and highly resource efficient lean logistic systems that benefit from integrated information-based facilitators, specialized vehicles (as cargo vessels or airships) and highly dependable automated cargo and baggage handling systems, building on solutions such as continued cargo (including luggage) tracking, indoor localization capability and integrated end-to-end logistic chain management systems, dimensioned for end-to-end tracking of elements along the chain.

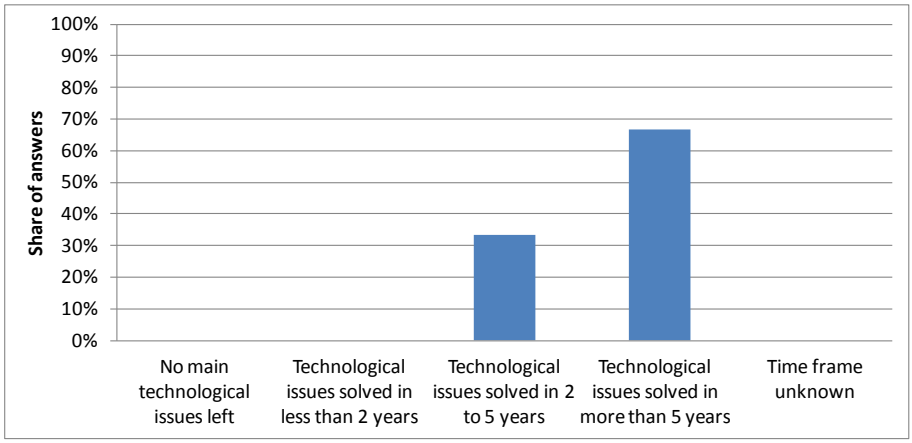
To this aim, the combination of KETs experts' opinions collected through the dedicated survey (whose result is depicted in the below bar chart), the examination of KETs-related patenting activity in respect to this Innovation Field, and desk research activities, have allowed identifying a rather strong interaction of KETs with respect to this Innovation Field, with either fundamental or important contribution mainly by the following KETs:

- Micro- and Nano-Electronics (MNE)
- Advanced Materials (AM)
- Nanotechnologies (N-T)
- Photonics (PhT)
- Advanced Manufacturing Systems (AMS)



Timing for implementation:

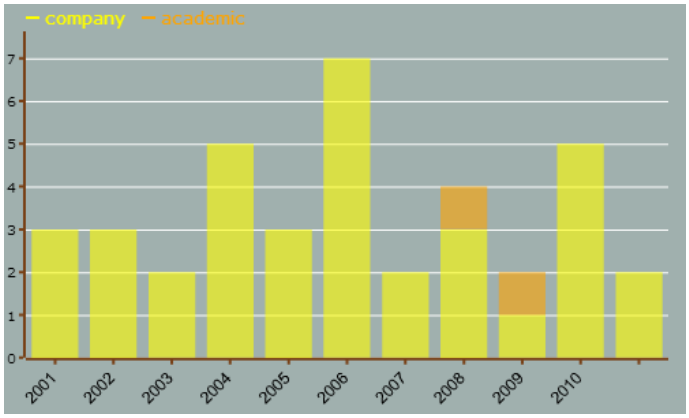
According to the majority of KETs experts' opinions (whose result is depicted in the below bar chart), desk research, and in line with the KETs-related patenting activity in this field, it is considered that the main technological issues holding back the achievement of cross-cutting KETs based products related to this Innovation Field could be solved in a time frame of more than 5 years:



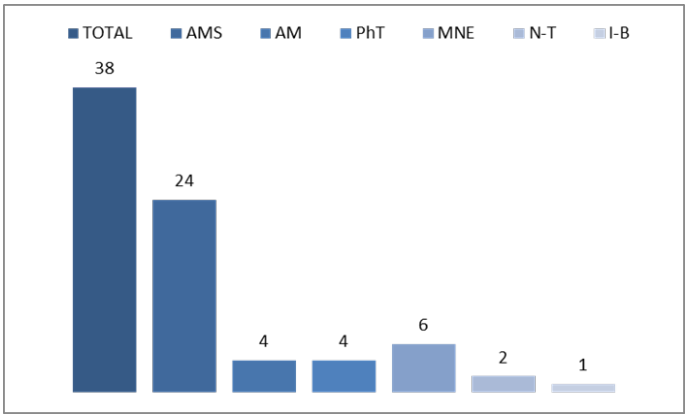
Hence, depending on the specific technical and/or industrial challenges holding back the achievement of cross-cutting KETs based products related to this Innovation Field, the provision of support in the medium term should be taken into consideration within this framework.

Additional information according to results of assessment:

- ***Impact assessment:***
  - The SEALS 2008 study conducted for the DG Energy and Transport of the European Commission estimated the weight of logistics – i.e. weight transport and warehousing operations – around 900 billion Euro generated annually in EU27, half outsourced, totalizing about 5% of EU GDP and 7 million jobs. For the same year, the Alliance for European Logistics gives the figure of 950 billion Euro revenue, making it "the biggest industry sector in the EU".
  - On average, logistics costs account for a significant 10-15% share of the final cost of an average finished product (Source: 2006 Communication from the European Commission on the Freight Transport Logistics in Europe), so that well run and efficient supply chains play a major role on industry and services competitiveness, and EU logistics efficiency is a direct lever of EU economy competitiveness. Logistics efficiency is also a matter of environmental efficiency, as freight transportation is responsible for a large part of overall global and European emissions, CO_2 and other pollutants. It is finally a matter of society responsiveness and creativity (many innovative services emerge directly as a result of the opportunities created by new very quick or responsive supply channels, or on the contrary are suffocated by sub-efficient supplies).
  - Coordination efforts, at the EU level as well as nationally, are quite recent in that industry is recognized as highly fragmented. Developing more integrated, multimodal, door-to-door and information-based supply chains is the strategic priority of the overall logistic sector, as the main possible source for progress, in line with the strong industry concern for setting up lean production organisations. Although not measurable, the importance of high performance logistic chains was highlighted by several of the experts interviewed along the RO-cKETs project.
- ***Results of patents scenario analysis:***
  - 38 KETs-related patents were identified in the period 2001-2011 as directly relevant for the Innovation Field
  - Quite stable trend curve (number of patents per year), but the low number of patents makes it a weak signal
  - Highest share of industrial applicants, with no clear patterns within the top ones; the logistics sector fragmentation is visible from the patents scenario analysis, as there is no player in leading position and many non-technological service companies (e.g. postal service providers) are present. However, one point to mention is the good position of Europeans, with a 50% patent share:



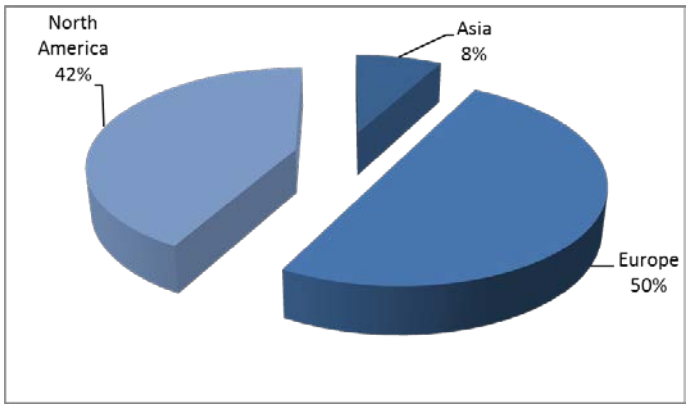
- Patents by KET(s):



- Patents by KET(s) and relevant combinations of KETs:

KET(s)	*Number of patents*
AM	4
AM / N-T	1
AMS	24
AMS / MNE	1
IBT	1
MNE	6
MNE / PhT	1
N-T	2
PhT	4

- Patent distribution by (Applicant) organization geographical zone:



- Patent distribution by geographical zone of priority protection: