Task 1.3.

Assessment of the research state at the local level related to the European trends and demand analysis

PURPOSE

According to the DoW in order to fully understand the potential of the RCs it's important to evaluate on one side their position related to the research and innovation trends recorded in Europe and to the general state of R&TI, and on the other side the distance from the innovation demand perceived on the local market.

To achieve these results, it is necessary to define and to analyze the existent knowledge about the state of the European research on the specific topic of urban logistics.

This is the first part of the activity to be developed within tasks 1.3.

A specific integration will be made analyzing the trends in two main fields which represent important support technology for the urban logistics, that is the ICT and the vehicle technologies (with particular respect to electric vehicles).

Moreover the planning documents of the main Bodies in charge of technological development, namely:

- *Europe 2020 Strategy with his Flagship Initiative "Innovation Union";*
- *The existing regional R&TI policies, plans and activities, their evolution and their impact;*
- *The existing national R&TI policies and support initiatives*

will be deeply analyzed by UCV in order to prepare a reference for the evaluation of the position of each RC compared to the EU Position.

The second phase of the activities will be to prepare a document describing the position of the RCs activities with respect to this reference framework; this will be done according to the methodology developed under task 1.1 and the information collected in task 1.2 about the local situation in the Regions..

This analysis will give the possibility to characterize the specific context of the RCs with respect to the external reality in a transnational context, as the one targeted by the RCs actions should be.

The outcome of the work will be a report containing the above mentioned analysis and the results of the comparative positioning analysis.

1. ORGANIZATION OF THE ACTIVITIES RELATED TO THE ASSESSMENT OF THE STATE OF THE ART (FIRST PHASE)

According to the methodology document assessed in task 1.1 and the subsequent segmentation of the research area the following matrix describes all the technology and products to be analysed; in the same way each Technology field has been assigned to Partners in order to perform the data collection and the preparation of synthetic status of the art of each Technological field.

	General Tech field	Specific Technology	Partner in charge
1	Freight distribution management systems	Simple software systems	FRI/LIB
		Fleet management systems	
		Integrated distribution management systems	
2	Special hardware for distribution management	Palm top for delivery management	LIB
		On-board devices for freight vehicles	
3	Special software for freight distribution systems	Software tools for freight distribution optimization	MOV
4	Support systems for regulation schemes	Access control management / charging systems	IPN
		Parking management / charging systems	
		Permissions release and management systems	
5	Automatic warehousing systems and handling systems	Warehousing systems	FRI
		Handling and picking systems and equipment	
		Loading / unloading systems and equipment	
		Automatic weight / dimension measurement equipment	
		Automatic labeling machines	

	General Tech field	Specific Technology	Partner in charge
6	Storage systems for transport	*Storage systems for transport*	UPV
7	Non-conventional vehicles	*Application of electric vehicles to freight distribution*	UPV/PE
		Application of other non-conventional vehicles	
8	Engineering and management	*New regulation schemes*	MET
		New distribution process schemes	
9	E-commerce platforms	*Platforms addressed by specific operators to the end users for on-line buying*	IPA/DMG
		Platforms b2b addressed by specific companies to other companies, shopkeepers, and other business subjects used for purchasing and managing orders and shipment	
10	Electronic devices for goods and vehicles tracking	*Barcode systems*	IPN
		RFID systems	
		GPS systems	
		Wi-Fi systems	

Moreover UCV is going to prepare a document related to the general European situation taking into the account: the planning documents of the main Bodies in charge of technological development, namely:

- Europe 2020 Strategy with his Flagship Initiative "Innovation Union";
- The existing regional R&TI policies, plans and activities, their evolution and their impact;
- The existing national R&TI policies and support initiatives.

DESCRIPTION OF THE ACTIVITIES

Each partner has to develop the activities assigned by the task leader according to the following scheme:

1. Data collection of the documents produced within within several European Programs, Civitas, CiTylog, Smartset Bestfact etcetera. Moreover the availability of advanced products and solutions on the market should be generally taken into account. This activity should lead to identify the most important and advanced technologies / solutions and the general situation of the sector in Europe

2. Preparation of the documentation which will be constituted of two parts:

    2.1. A short synthesis of the general situation related to the specific technological field (descriptive)

    - General Concept / Content

    - Possible integration with other technologies (within the same tech field)

    - Main applications in EU,

    - Research and technology development.

    2.2. For the most important technologies / application a specific record containing:

    - Description of the technology / solution (working principle, technical characteristics, etc.)

    - Main application in Europe experiences

    - Results of the applications done

    - Perceived potential

    - RTD activities in progress, if any

The annex template shows which are the main information to be collected.

Annex 1

Task 1.3: **Assessment of the research state at the local level related to the European trends and demand analysis**

Technology field: **Special hardware for distribution management**
(please refer to the general tech matrix developed under 1.1 task)

Specific technology/solution: *On-board devices for freight vehicles*
(please refer to the general tech matrix developed under 1.1 task each partner for the allocated technologies)

Description of the technology/solution:

ON Board Units technical characteristics guarantee nowadays an impressive range of functionalities, offering transport service providers and fleet managers the possibility to collect and easily manage different relevant information.

OBU, that could be considered as a part of the integrated distribution management system, are used mainly for these macro area of interest:

- tracking and tracing of vehicles and/or trailer: thanks to GPS communication and a connection to GIS systems, these data are used to monitor position, optimize routes, verify respect of expected route plans

- On Board Diagnostic (OBD sub-system): thanks to connection to different possible sensors installed on board, these data are used to verify in real time vehicles performance (fuel consumption first) but also to have alerts about possible critical situation and/or optimize maintenance program;

- e-toll and e-call: support to electronic payment in motion and/or emergency calls

- operations/conditions control: thanks to connection to specific sensors, it is possible to verify stops for rest or loading/unloading operations and their duration, doors opening/closure, inspection procedures, products temperature and many other

- drivers performance evaluation

- general communication to/from vehicle/driver: reception or provision of real time information (new required delivery/picking, traffic information...)

- surveillance monitoring and reduction of risk of theft: vehicles/trailer: exact and real time location up to 1-5 meters tolerance, video streaming, control of operations involving goods (door openings/closure, loading/unloading, packaging)

Technical characteristics could vary according to different producers/products, ave according to the specific use of any different device available on the market:

- small and robust case, to facilitate installation on board and to guarantee proper use in any working condition: temperature, humidity, vibrations, shock, bump...

- low power consumption and local data storage

- flexible and easy to use interfaces: LCD displays, Bluetooth, CAN vehicle interface, external RS-232/485, external CDC-ACM, USB, NFC, accelerometer, led for status indication, internal temperature, EPROM, micro SD card, digital and analog I/O

- compatibility with IEEE and automotive standards, banking-grade security

- GNSS receiver (in accordance with GPS-SPS), MPS and gyroscope for dead-reckoning

- GSM/GPRS/CDMA communication

- remote management of parameters, firmware and geo-object capabilities

- DCRS (Dedicated short-range communication) functionalities

Different specific application OBU are on the market.

Kapsch TrafficCom created high product configurability, standards-based interfaces, user-friendliness and esthetic, yet robust design and offers a wide range of On Board Units, to support different customer specific needs,

(source: https://www.kapsch.net/ktc/products/in-vehicle/5-9-wave-dsrc-on-board-units)

Telargo Telargo On-Board Units are a highly advanced telemetry, positioning and communication device, with an ergonomically designed handset and user-friendly interface as well as a variety of further expansion and integration options

(source : http://www.telargo.com/overview/technology/on_boardequipment/obu.aspx)

BPS Ninja provides live audio/visual and GPS tracking surveillance monitoring - notifying you instantly of any interference during shipping, thereby reducing carrier risk of theft smuggling or tampering

(source : http://www.bps.co.ee/new_site/ninjaforlog.html)

Main applications:
(referring to urban logistics field)

OBU can be used in different specific application, first of all tracking and tracing of vehicles and trailers particularly interesting both for activities optimization and security reasons: advanced technologies guarantee exact positioning (up to 1-5 meter) using different communication systems. These data, connected to available GIS maps, offer the possibility to define/update best route even in real time and to control shipments (vehicles and/or goods) but can also be used for security reasons especially in particular conditions/situations (containers removal, products losses...).

Other important applications are related to distance base road charging systems thanks to the interoperability of infrastructures all European countries are working on (EETS European Electronic Toll Service) e-call or automatic transmission of alerts, related to dangerous driving practices, roll-overs or serious accidents, even distinguishing a vehicle hitting something or being hit.

Thanks to easy and interoperability with other existing devices/systems, OBU can be used to collect information about specific indicators related to vehicle/driver performance, respect of regulations and completion of planned activities/processes. So far, OBU application and their flexibility can lead to reduce fuel consumption and pollution emissions, to reduce/eliminate possible enforcement, to properly control loading/unloading activities, specific events as doors opening/closure or product/goods conditions like temperature.

All described applications are supported by geo-object functionalities, to adapt to the exact position of vehicles/goods.

Use and results of applications done:
(analyse the experimentations done by cities with special regards to European programs (i.e. FP7 funded projects, Civitas and other)

GoodRoute project (http://www.goodroute-eu.org) funded under 6th FWP within framework "On board Telematic System", analyzed possible use of OBU to optimize monitoring of vehicles and trailer shipping dangerous goods. The overall system architecture included the application of OBU connecting to a Control Centre on vehicles and trailers, with the possibility to collect separate set of information (if and when necessary or useful), using GPRS devise for long range communication and DSRC for short range (enforcement requirements and V2V capabilities). Main goal of the project was to the definition of the information and parameters needed to monitor vehicle and goods and the description of the communication links used to share and transfer data among the vehicle, the control centre and the infrastructure. Technical iteration tests, laboratory tests and on site test (Italian Frejus Tunnel) have been completed to validate results and led to guarantee a satisfying degree of usability of the system.

Freight Best Practice (http://www.freightbestpractice.org.uk) funded by the Department for Transport and managed by AECOM to promote operational efficiency within freight operations, focused its attention also on OBU specifically considering navigation systems.
A case study was analyzed, with regard to Scottish haulage contractor Yuill & Dodds Ltd with a fleet of 100 vehicles. All vehicles have been equipped with TomTomLINK black-box, giving drivers the possibility to have real time updated best routes, taking into account fundamental information about vehicle's weight and dimensions and their compatibility with road network. Major benefits observed have been reduction in phone bill costs and the time and the fuel saved through drivers navigating to their destination.

Many other projects and application interesting more or less directly the use of On Board Units, considered as a part of the complex supply chain management: reduction of congestion or pollution for example have been considered as target of many projects and they requires the use of OBU to optimize routing in urban areas or reduce fuel consumption and emissions.

Perceived potential:
(describe the potentialities of the analysed topic in terms of future applications, impact on the process, innovation, etc.)

A more extended use of OBU, due to the fact that these devices represent the technical support for different functionalities, can lead to clear advantages for Public Authorities, citizens, transport service providers and their customers.

At European level, it will support in progress activities aiming at increasing efficiency of transport systems and interoperability along international road networks (e-toll, e-call, customs procedures/controls, intermodality, infomobility...) by implementing shared standards and protocols for data collection and use. In this sense, continuous development of technologies is required, in order to make it easier its implementation by all involved stakeholders and to achieved the expected goal of an almost complete interoperability and to extend application to more and more "international" processes.

At national/local level, apart from those already described, the use of On Boards Units could support Public Authorities to define and apply policies as road charging (Milan Ecopass, where vehicle pays automatically according to specific characteristics and time windows) Limited Traffic Zones access control (Verona, where duration of presence in downtown is limited for commercial vehicles). Different context and limited available resources (small cities, small companies) should have to push manufacturer to develop cost-effective solutions, including probably most useful functionalities.

At "private/Companies" level, the use of OBU can lead to visible costs reduction (fuel consumption, travel time, deliveries management), efficiency increase (drivers productivity), customer satisfaction (shipments real time control).

All these pros could also indirectly lead to a better quality of life, especially in congested urban areas, thanks to congestion/pollution reduction.

RTD activities in progress
(describe the RTD activities in course, or the possible envisaged RTD needs)

R&D tends to improve capabilities of OBU by adding functionalities even if with an easy-to-use set of interfaces and guarantying the possibility to connect OBU with as many devices as possible (V2V, V2I communication), in compliance with shared standard and protocols. This

particular aspect, due to increasing set of regulations related to data collection, data transmission, data exchange and communication and their development.

Variety of possible customers (needs, resources...) requires the development of a wide range of products, including more or less functionalities, but reducing as much as possible costs and making it easier the use of these devices.