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 UCVin 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/University**
		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, SmartsetBestfact etcetera. Moreover the availability of advanced products and solutions on the market should begenerally 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:**Automatic warehousing systems and handling systems**
(please refer to the general tech matrix developed under 1.1 task)

Specific technology / solution:*Loading / unloading systems and equipment*
(please refer to the general tech matrix developed under 1.1 task each partner for the allocated technologies)

Description of the technology / solution:

Loading and unloading solutions are closely related to the warehouse dock area.

Everything that in and out in the warehouse moves across the dock: this represent the area of the building where the truck are loaded and unloaded.

The position of the loading dock can be exterior or fully enclosed and generally it gives direct access to the freight elevator or to the staging area.

The equipments related to the dock are the dock leveler that represented a platform, activated with hydraulic, mechanical or air powered systems: this equipment is used like a bridge between the dock and the truck.

Another very important equipment is the vehicle restraint systems composed by one hook that is mounted in the base of the dock and this is hooked to the frame or bumper of the truck: this system is very useful to avoid the vehicle rolling away during the loading and unloading manoeuvres.

Moreover the system is equipped with controls systems, like indicators light and loading dock software: the first indicates to the truck drivers the time for the back in or the pull out whereas the second system represents a tracking of the dock activities.

Another equipment is the loading conveyor that is composed by a series of consecutive slats, made of steel or aluminium; the system is used are warehouse conveyor or it can built into the cargo floor of a truck.

To support these equipment is essential the use of the forklift truck, stackers and the more simple hand pallet truck that allow the lift /un-lift of goods and the management of they.

Another equipments that is used more often for the simple operation of loading and unloading of the truck, in a urban environment, are the ramps: these placed in the posterior

area of the trailer allow the transport of the good (by the means of a manual cart) from the trailer to the floor.

One of the most used equipment to move the cargo from the trailer to the floor is the tail lift: a mechanical device, permanently fixed to the back of a lorry,help(with an hydraulic system) the handling of the freight from the ground level (or a loading dock) to the load bed of a vehicle.

Main applications:
(referring to urban logistics field)

The loading and unloading activityis a central element for the urban transport especially in the inner-city: these activities is often the cause of the time increase (delays) in the freight transportation system.

Another of the main issue related the load and unload activities, especially those in the inner city supermarkets, is the noise.

In this direction there are researches devoted to introduce in the general equipment, involved in the loading /unloading equipment, solutionstowards the noise reduction.

A very important aspect is the traffic congestion caused from these activities in the urban area that are notcompletely designed for theseoperations.

Concerning the latter problem there are some initiatives that go toward the time scheduling of the load/unload activities in specifics time slots of the day: especially in the night.

Use and results of applicationsdone:

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

The STRAIGHTSOL (Strategies and measures for smarter urban freight solutions) project, inside the seven framework of the European Union, wants to support innovative field demonstrations toward the improvements of urban-interurban freight operations in Europe.

One demonstration concern the two most important Belgian food retailers Colruyt and Delhaize; due to the high congestion of traffic during the peak-hours (delay in delivery of over 33%) these resellers are keen to start the delivery in the night.

The demonstration, at the first stage, will take place in 5 places and the noise of loading/unloading operation will be measured. The resellers are constantly investing in silent truck, silent rolling stock and moreover in the education of the truck driver to work quietly. The second stage of the demonstration will concern real nigh delivery for a period of one month: the noise will be monitored in constantly and moreover will cover the next four days following each delivery.

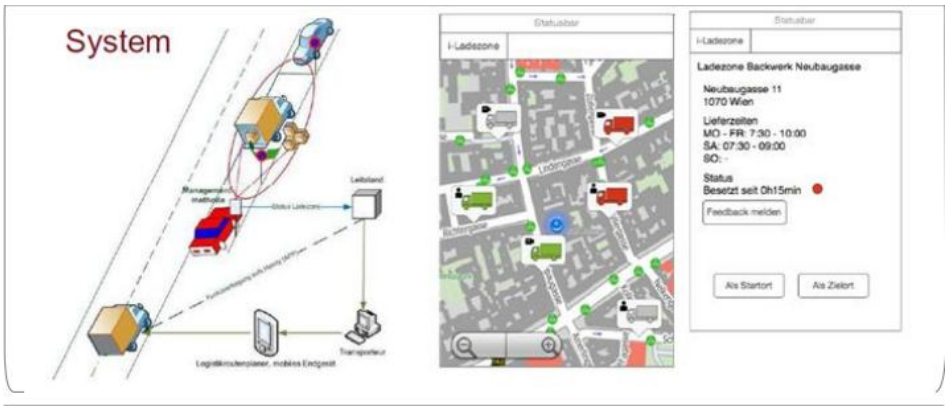
Another case study of the STRAIGHTSOL project concern the problem of the city of Lisbona where there are unregulated loading/unloading activities that cause road congestion and illegal parking. The specific demonstration will test two new technological based scheme:

1) the use of adapted parking meter, that delivers ticked of 30 minutes for the activities of loading and unloading ; the system is activated when the operator exposed a contactless card 2) the use of loop detection sensors installed on the ground: the sensors reveal the presence of a vehicle in the parking place and communicates the presence of the vehicle to the parking manager; this will allow the operation on loading /unloading for a time of 30 minutes.

Another project, that aims to get more efficient the activities of commercial traffic, is the smartfreight project of the seven framework of the UE. One of the objective of the project, inside the activities of coordinate all the freight distribution operations by mean of ICT service, is to manage the use of the loading /unloading areas.

The I-Ladezone project (BESTFACT) intends to monitoring in an efficient way the loading bay in the city of Vienna. The project focus in developing a management system of the loading

bay: at the first step the system evaluates if the loading bay is used at all, whereas at the second step the system will check if the user is authorized to use the loading bay.



I-Ladezone in Vienna (source: BESTFACT)

A project concerning the scheduling of delivery during the night took place in Barcelona Municipality. In 2003 the latter public authority, within the MIRACLES-CIVITAS project,scheduled the first night time delivery: in this trial the factory partner is the MERCADONA that owner a nation chain of supermarkets. The vehicle utilized for the trial, the first night-time quite delivery, is a 40 tonne truck that executed delivery in the inner city stores; for the aim of the project the vehicle is modified with special technical solutions for the noise reduction:

carpeted loading platform and truck bed, low-noise rubber wheels and low-noise pneumatic lifting-system technology (fork lift and truck ramp). Moreover the employers in the loading/unloading activities used procedures oriented to avoid voice communication.

In Netherland in 1998 the “Decree Retail Trade Environmental Protection” came into effect. The decree set that the noise emission generated from the loading /unloading activities, in the time between 19.00 and 7.00, must be lower 65db(A) from 19.00 to 23.00 and below 60db(A) in the time between 23.00 to 7.00. In 1999 in order to respect the noise level is adopted a long-term PIEK (peak noise) program that is composed by 10 measures: create the optimal loadind/unloading bay, low noise transport refrigerator systems, reduce noise of roll-container, pallet-truck and handpallet-trucks etc.

The city of Bremer adopted a pilot project, supported by the PARFUM-Project within the the LIFE programme of the EU, to developa Environmental Loading Point (ELP) at Jacobikirchhof in a specific area near to the pedestrian area and its shops. In the area have access only

EURO5 vehicles with a weight up to 7,5t and a length lower 8,5m. The user need a permission, that it is checked in automatic way, to access to the loading point; in the initial project the loading time is unrestricted but for the management of many deliveries it is necessary to adopt measure in this direction.

In the city of Barcelona there was the SMILE project: Street Management Improvement for Loading/Unloading Enforcement; one of the objectives is to obtain a better knowledge of the pattern of on-street goods deliveries. Another objective is toimplement measures that correspond to the inadequate in kerbside space provision and signing.

Perceived potential:

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

From the previous applications it is possible to understand how the matter of the loading and the unloading action, is a crucial aspect for the sustainability of the freight distribution in the urban city. The efficiently of the system is determine by many factors that need to be harmonize together: the time of loading action, the location of the loading bay, rules to access to the bay, length of the time for a loading, the noise aspects etc.

The goodness the loading/unloading activities is crucial because the inefficiencies of these have very heavy fallouts in the city global transportation system and in quality of life of citizen.

Concerning this latter aspect it very important to invest more and more in the reduction of the noise caused by the equipment involved in the loading activities: roll-container, pallet-truck etc.

To enforce the activities in this field it very important to follow the direction traced from the Netherland in the long term PIEK program: fix a bound for the allowed noise in the loading /unloading activities.

RTD activities in progress

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

Due to the constantly increasing of the containers transportation and the size of vessels there are studies devoted to the development of automatic container cranes in the port area.

The idea is to find, with the use of the genetic algorithms, an optimum route that can minimize the cycle time by calculating the most efficient combination of horizontal and vertical motions of container loading/unloading (Youfang.H, 2009). The formulated mathematical model consider factors including length, smooth degree and safety distance.

Yard crane (source Youfang.H, 2009)

The product handling activities play one of the biggest cost and in general represent one of the element that influence the product velocity and affect the load time it takes to deliver the product to customers. In this contest a well designed shipping and received facility play an important role. The dock design and the assessments of the dock bay requirements is one of the biggest cost. To face the problem there are the development of mathematical solutions, one of these is the study ofAvninder that adopted a fuzzy set theoretic approach to address the dock bay requirements of a loading facility when the throughput, truck capacity, dock availability and loading times have a certain degree of imprecision or

vagueness involved.To perform the goodness of the dock bay in supporting a certain level of dock activities is developed a dock performance index (Avninder.G, 2009).