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: **Freight distribution management systems**
(please refer to the general tech matrix developed under 1.1 task)

Specific technology/solution: *Simple sofware system*
(please refer to the general tech matrix developed under 1.1 task each partner for the allocated technologies)

Description of the technology/solution:

Management of warehouses operations is supported by software and hardware technologies/solutions, specifically designed and developed to support any process:

- Inventory Control,
- Storage Location Management,
- Quality Control Interfacing,
- Order Selection,
- Automated Inventory Replenishment,
- Receiving,
- Shipping,
- Operator Productivity,
- Report Generation,
- Preparing activities of orders,
- Manual scheduling of activities reception of products/goods based on the scheduled plan.

A central systems collects all information about entrances/exits of products/packages to/from the warehouse and even using a PC or a wireless portable PDA connected to this core element it is possible to know in real time if a product is available and to know its position. It is possible to use wi-fi mobile devices where some or all functionalities are installed, to improve efficiency of processes and work of operators or it is possible to use specific devices to label products and to read these labels reducing time to identify products/packages, even automatically in different transit points of the warehouse (first of

all entrances and exits) with proper gates, to have a real time information about products/packages movements.

In addition other modules more specifically focused on transport of goods within the warehouse have been developed and are available on the market.

SisTrade (http://www.sistrade.com) offers a complete solution including both software and hardware components, useful to manage all processes and properly control in real time consistency of stocks, localization of products/packages, movements of goods/products within the warehouse.

(source: http://www.sistrade.com/en/Solutions/mis-erp-sistrade-mobile-warehouse.htm)

Portable devices give operators the possibility to label products or to read their code in any part of the warehouse, simply connecting to the central system to share information.

(source : www.sistrade.com/en/Imagens/ERP_Sistrade_Mobile_Picking.gif)

An automatic control of product/packages position/movements is possible through a terminal of radio frequency

(source: http://www.sistrade.com/en/Imagens/ERP_Sistrade_wire_Mobile_Picking.gif)

Egemin Warehouse Management System (http://www.egemin-automation.com/nl) offers a complete solution, separating the administrative layer (Management) and a second layer related to all features regarding material flow control (Control).

Administrative modules are "Inventory management" to verify stock in accordance to entrances/exits of products, and "Order" managing picking stations, docking lanes according to different priorities.

(source: http://www.egemin-automation.com/en/automation/material-handling-automation_ha-solutions_automated-warehouse-systems_wds-systems/order-picking-systems)

Control modules are "Location" to assign products a certain location and check it through a five dimension code, and "Transport" to monitor movements of products between different zones of the warehouse.

(source:http://www.egemin-automation.com/en/automation/material-handling-automation_ha-solutions_automated-warehouse-systems_wds-systems/transport-systems)

Main applications:
(referring to urban logistics field)

The use of these simple software increases efficiency and productivity of transport service providers within their warehouses and, consequently, even on the overall supply chain, even if a direct impact specifically for the urban logistic can't be observed.

From a technological point of view, the optimization of processes within the warehouses could be interesting most of all in the perspective of creating distribution centres and or adopting policies as urban freight consolidation scheme.

In these cases, the WMS could definitively increase efficiency of a distribution centre and/or a policy applied, most of all because if it would be necessary to have cooperation between different stakeholders and, possibly, competitors.

(source: http://www.lucense.it/content.php?p=1.1.3.2)

At urban level, it could be expected to have a warehouses that could be the link between different service providers delivering goods arriving from external areas (or collecting goods directed to external areas) and a third party in charge to manage movements of goods to/from the city centre, maybe with low emission vehicles: it is clear that in this case a WMS able to efficiently manage, pack/unpack, find or allocate products could influence vehicles trips, scheduling and efficiency.

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)

A relevant project regarding warehouses management system is Net-WMS, a Specific Targeted Research Project (STREP) co-funded by the European Commission in the sixth Framework Programme. The project lasted 40 months, from September 2006 to December 2009 (http://net-wms.ercim.eu/)

The project, developed by a Consortium including industrial partner testing the defined solution, led to a relevant increase of efficiency of software solutions used to manage warehouses processes, generally "limited" to management of stocks and movements of goods, by adding advanced functionalities as packing tools to determine how to pack items, how many cartoons are needed to pack customers items or how to pack items on a truck according to its stability. Main goals of the project were to reduce cost of packing up to 10%, contribute to competitiveness of Companies and exploit solution to cover sectors in logistic still uncovered.

The solution, tested by the industrial partners of the consortium, as PSA Peugeot Citroen, CRF Fiat Research Centre and KLS OPTIM representing a variety of pallet loading, container loading and assembly-line design problems, highlighted the possibility to apply the same solution to different real scenario worldwide.

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

The developed solution, based on a solid middleware architecture, could be used as a standalone software but could also be integrated in a Service Oriented Architecture (SOA). Flexibility of the solution lead to consider it applicable to any possible situation, offering

most Companies the possibility to solve automatically problems managed by hand and defining possible solution taking into account all possible constraints.

Even if results were relevant, some key aspect of the processes in logistic could be better analyzed in near future, as for example higher dimensional bin packing problems with rotation and handling of complex (non rectangular) shapes.

RTD activities in progress

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

The technological solution available in the market for warehouses management are mostly "limited" to listed tools, while the developed solution increase number and application of easy tools, even if variety of processes requires new analysis and research, in order to better manage even particular processes of specific companies/logistic organizations.

The research consortium that developed this solution has been enlarged and continues to investigate this topic, with focus on first next steps to make: dissemination of results is ensured by industrialisation made by KLS OPTIM.

With regard to the urban freight distribution, it is clear that the possible application would be related to Distribution Centres where different operators should have to cooperate and diverse constraints should have to be considered and solved: the most problems could be simply solved, the highest number of different operators could be interested/involved in joining the opportunity to work trough/thanks to possible distribution schemes defined by municipalities, including Distribution Centres.