

### **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 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:** Automatic warehousing systems and handling systems

*(please refer to the general tech matrix developed under 1.1 task)*

**Specific technology / solution:** Warehousing systems

*(please refer to the general tech matrix developed under 1.1 task each partner for the allocated technologies)*

#### **Description of the technology / solution:**

The primary purpose of a WMS is to manage the overall activity within a warehouse and process the associated transactions from the receiving to the shipping.

It is possible to range from warehouse management system (WMS) that execute a simple stock location control to systems that can nearly maximize customer satisfaction, labor, space and equipment in the warehouse.

The technology solutions are essential for the management and the efficiency of a warehousing system. A computerized WMS is the integration of bar coding technology, radio frequency (RF) communications equipment, hardware, and software. The real time radio frequency (RF) communication allow the information availability: this element permits to the warehousing to be responsive to the changing need so that it is possible to re-deploy equipment, space resources and labor with the aim to maximize the performances. Moreover the RF system allow the labor pacing intended as the communication between the system and the operator so that the system is able to pace the operator from one assigned task to the next. The RF allow the material tracking, so that it possible the verify the all transactions that affect material location: the system is immediately aware of empty storage locations as they are created and can assign them to putaway loads immediately, without manual searching of the rack.

The WMS server is the heart of the system because it manage all the communication flow originated by the working system.

A responsively WMS server it essential to allow an effective real time communication: the volume of the latter is related to the specification of the computer. The other essential technology in a WMS system is the bar coding read with virtually instantaneous label

scans. First of all it makes possible the labor reduction, by reducing the time required to identify loads and locations to support the real-time RF communication transactions. Bar coding systems reduce drastically the error in the phase of the data acquisition: with the keystroke data entry there is one error in 300 keystrokes whereas with bar coding there is one in one to two million scans. Finally with bar coding it is possible the compliance labelling; customers are demanding bare code label in standard format on all product. Bar coding represented a very important support for data collection and for the real time RF communication.

### **Main applications:**

*(referring to urban logistics field)*

At international level it is possible to find actions that integrate in the urban area the technologies coming from the WMS adding others technologies that allow the flowing of information in open space, like the internet connection and the GPS systems. Concerning the necessity to disseminate, in UE, of the best urban freight solutions (UFS) is important to report the activity of the BESTUFS (BEST Urban Freight Solution) UE project of the 5th RTD Framework Programme and the following project BESTUFS II (6th RTD Framework Programme).

Between the application of WMS in the urban logistics field are very interesting the urban distribution centre model and the urban freight consolidation scheme: models that offers solution for the warehouse and freight logistic in the urban area with many benefits for the quality of life and for the environment aspects.

### **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)*

In Europe have been defined the urban distribution centres: these are the consolidate warehouses than optimize the condition for an efficient distribution. For example distribution can be realized during the hours of day with the lowest traffic density, during the day and the night, and moreover with energy efficient vehicle. The distribution centres can be located underground or at strategic points that represented the best solution for a short distance distribution. The Spain Municipality of Victoria Gasteiz, inside the UE CIVITAS Modern project, executed a pilot project with the main objective to define a new system of distribution of goods in accordance with the application of the superblock philosophy that is capable of calming traffic and returning to pedestrian's quality public space nowadays occupied by vehicles. Within this philosophy the freight distribution is reserved in the proximity area enclaves to the superblocks. To use this model is necessary that it established a friendship between economical activities and involved agents.

The core centre of this approach is the definition of the logistic platform that represented the strategic points for capillary distribution at short distance. In this platform the main role is expressed by the Urban Distribution Centre (UDC) that in general coincides with the underground parking that could work as stores of distribution and/or consolidation. In this system the goods delivery is done in surface and the goods enter and go out of the store by means of hoist systems.

In the field of logistic another solution concern with the extension of the inner city logistic centre; starting from this element the city port of Westhafen (at the western edge of the city of Berlin) has been extended with three-modal terminal that combine railway, road transport and inland navigation; with this organization only short distance have to be covered by lorries.

Another solution concern the urban freight consolidation scheme of the city of Bristol; in this scheme the core is a secure warehouse locate in the closest proximity to Bristol city so that it is possible to reduce the mileage and it is possible to use green electric vehicles. The solution allow to receiving orders from multiple vendors and retailers 24/7, placing these onto delivery cages or other media and cross-docking them in preparation for delivery into store. A key element for this solution, especially with high volume of work, is to guarantee the stock traceability and security: this is allow by radio-frequency scanning systems with real time visibility. The DHL company developed the Styleflow tracking system that allows all the possibilities illustrated in the below scheme:

- **Bookings**
  - Authorization to supply
  - Regular and one off bookings
  - Capacity controls
  - Outbound Allocation
  - Reporting
- **Yard Management**
  - Access control
  - Supplier compliance
  - Reporting
- **Product Tracking**
  - Goods received
  - Goods allocated
  - Delivery media associated
  - Security sealing
  - Load planned
  - Loaded
  - Despatched (includes Paperwork)
  - Arrived at terminal
  - Delivered ( GPRS )
  - Reporting
- **Media Tracking**
  - Ownership at service provider
  - Ownership at retailer
  - Returns
  - Reporting
- **Helpdesk**
  - Customer information
  - Open / Closed
  - Referencing
  - Reporting
- **Supplier / Customer Review**
  - Supplier performance
  - Service provider performance
  - End user performance



Styleflow IT system (source: TRAILBLAZER co-founded by Intelligent Energy Europe)

Another solution is the Binnenstadservice that is available in 15 Nederland cities. The supplier of the service managed an Urban Consolidation Centre: this is a logistic depot and distribution centre. The goods destined to the retailers that use the service are delivered to the Consolidation Centre by freight operators. In the Centre goods are bundled and delivered to the shops in the city centre. At the same time, with the same service, the packaging and paper return to the Consolidation Centre.

**Perceived potential:**

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



At the moment especially the main manufactures/shippers have increased their productivities in the scenario offered by the urban distribution center; at the same time only the area involved by pilot projects or the big cities have developed a more efficient way of goods managements and distributions.

The potentialities offered are very interesting in term of reduction of:

- the delivery trips for the retailers (in the Bristol city the reduction is about 76%)
- air pollution

From the reduction of the delivery time is possible to use vehicle with a lower autonomy, like the electrical vehicles: with this vehicle there is the reduction of the air pollution plus the noise pollution.

In general term the results become more and more evident when urban warehouse model will be transfer from the big centers to the small area where even small and medium manufactures/shippers could use these services.

Moreover the cities are keen to expand the value of the service that are offered at the consolidation warehouse like the stock rework and storage services and other.

### **RTD activities in progress**

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

The RTD activities concerning the introduction of emergencies technologies in the WMS system.

One solution is about the application on RFID in the WMS; that allow to eliminate human error, gain more control inside the warehouse. In this case forklift can be equipped with RFID terminal like reader and antenna so that it can be a support for automatic data scanning and storage location checking. Moreover with RFID fixed reader set to the in and the out of the warehouse and other reader placed on the automation equipment, RFID asset and location tags on waypoints and assets, it is possible that the WMS provide an high level of automation, error reducing and decision support (Cheri Amour Calicdan, 2013). Even Poon

(2009) propose an implementation of RFID technologies inside the WMS; in the fig.1 there is an example of the possible implementation.



Fig.1 RFID technology implementation in a warehouse environment

One of the most innovative project is the Net – WMS; the main objective of the project is to significantly increase the competitiveness of Supply Chain Management: that through the integration of novel optimisation and virtual reality components in a Warehouse Management System (WMS). The project is supported by the IST Programme of the European Commission.