



INSTITUTO TECNOLÓGICO DE ARAGÓN

DEMONSTRATOR CENTER OF ICT FOR LOGISTICS

CENTRO
DEMOSTRADOR  **TIC** | LOGÍSTICA



red.es





The Public Demonstrator Center is a public space in which interested ICT companies may demonstrate how their technology products and services can help to create innovative solutions, and improve the productivity and competitiveness in the field of logistics. Additionally, the demonstrator center will serve as a meeting point between innovation and business needs.

The mission of the Public Demonstration Center is being the connection between ICT companies and technology suppliers of Logistics companies demanding solutions that increase the productivity and competitiveness of their products and processes.



The vision is being a reference in promoting and spreading the use of ICT in the logistics sector mainly through consulting, training and technology.

Main objectives of the Public Demonstration Center are:

- Promote the creation of meeting spaces between suppliers in the ICT sector and the potential demand for logistics companies.
- Disseminate the benefits of incorporating ICT into production processes between companies in the logistics sector.
- Facilitate the transfer of technology, specialized services and knowledge between the ICT sector and logistics companies.
- Advisory, train and develop technology companies.
- Provide the needed infrastructure for testing the innovation technologies to the logistic companies.

The Public Demonstrator Centre ICT for logistics sector is located in a building next to the ITA (Aragon Institute of Technology) in the Campus Ebro River comprising most of the centers and technical institutes in the region. The situation also encourages the creation of spaces for meetings between suppliers the ICT sector and the potential demand for logistics companies.

One of the objectives from the Government of Aragón, is to contribute to the development of companies in the sector and information technology communications, as well as strengthening the logistics sector, supporting performances to the promotion and dissemination of information technologies and communications that serve as support to this sector. Red.es, is a public company under the Ministry of Industry, within the Network and Business Program to help strengthen the ICT industry, launched the initiative to create Demonstrators Centers as part of the Development Avanza2 Plan, which aims to support companies that develop new products and services with a high ICT. Based on these common interests, Red.es contacted the Government of Aragón in our community to create a public ICT Demonstrator.



Exterior view of the Demonstrator Center



Interior view of the Demonstrator Center

The demonstrator public center is divided into several areas that can be identified as the center modules considering the equipment installed. The ground floor consists of central storage area, the point of sale module, transport module and conference room, while the first floor has a central demonstration area of supply chain. The equipment according to classify the following modules:

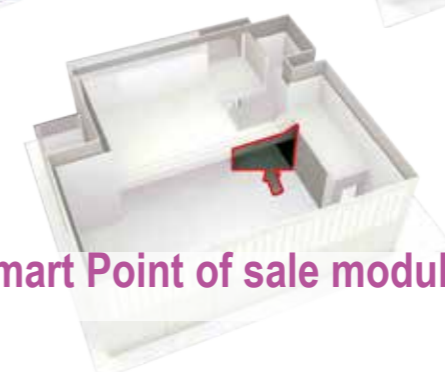
Smart Store Module



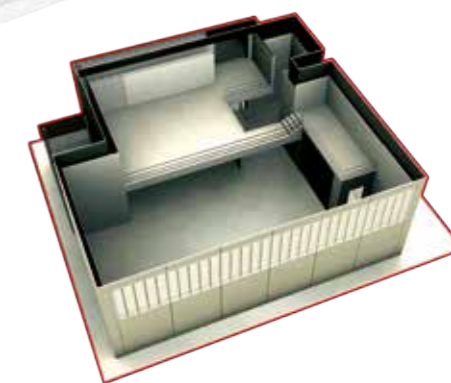
Supply Chain Module



Smart Point of sale module



Intelligent Transport Module



SMART STORE

Objectives

This module is to address commonly logistics processes that normally occur in the enterprise facilities. That is, the reception and classification of the goods, their movements in the distribution center and the preparation of orders or configuration of the location and inventory for storage. At the same time of the internal flow of materials it must provide a logical flow of data, synchronized with the above. This is achieved by monitoring systems and software modules for data processing and distribution.

The demonstration equipment for storage solutions consists of two main systems: Packaging sorting system and the Smart warehouse system.

Each of these systems is equipped with the technology needed to perform the functions, both physical and logical, to create internal logistics processes that are demanded by users Demonstration Centre.

Main objectives of this module are:

- Technologies for receiving, picking, shipping, storage and characterization methods of automatic goods
- Create a real operational scenario of an intelligent warehouse space featuring test different products and processes

Equipment

- Configurable automatic picking
- Manual preparation system orders: PTL and PTV
- Arch with automatic identification of pallets using RFID and vision cameras
- Material handling system with integrated RFID reader homing
- Shelves with automatic stock management using sensors

PACKAGING SORTING SYSTEM

A “Packaging Sorting System” is a technological solution that automates the orders preparation making picking to unit possible and integrates different identification and control automatic and dynamic devices.

The system is integrated by mechanical components, which contains conveyors that physically move the goods, with the objective of making demonstrations of various logistics flows of materials within the companies. It has a coordinated behaviour and it's compatible with the rest of modules of the system.

These modules are:

- Electrical components, control and security module.
- System parameterization module.
- RFID identification module.
- Vision based inspection module.
- “Put-To-Light” orders preparation module.
- System control module.



Packaging sorting system

Main parts of this equipment are:

- Gapping zone: allows the separation of packets that are being moved without separation and are not detectable with automatic identification control elements. They consist of several short sections of tape which can maneuver (stop or change speed) to achieve separation of the packages.
- Parameterization zone: to identify and obtain relevant parameters of the packages: dimensions, weight, code tags, and so on.
- Piece picking zone: the aim is to allow the operator to pick through the boxes that are extracted from the main circuit of the conveyor belt. This belt is parallel to the main one and includes the possibility of return boxes automatically or manually. It consists of several short sections of the conveyor belt where it is possible to stop a box needed for the preparation order. This area works together with the shelf of PTL (put to light), located close to the belt.
- RFID and vision zone: to prove the use of these technologies in the control and traceability of goods.
- Inputs and outputs zone: allow to add goods to the conveyor belt and the final output of goods. Each output ends in a roller table not motorized.
- Rejections zone: allows the belt to provide an exit point for packets that the system assumes rejected or not able to work with them. End table without motorized rollers.
- Transport zone: consists of two curves and two straight elements equipped with diverters to circumvent the curve segment. The system will be designed to ensure the ‘tracking’ of the package in the rotation.

SMART WAREHOUSE SYSTEM

A “Smart Warehouse System” is a technological solution that automates the input, output, order picking, inventory control and handling of the goods on the ground.

It consists of several modules: ‘Pick-To-Light’ picking module, ‘Pick-To-Voice’ picking module, the automatic identification portal and the Inventory Control Module. The first two technologies are designed to demonstrate the productivity gains in the area of the picking process, one of the most resource-intensive and cost in a store.



Pick to light shelf

The automatic identification portal facilitates the identification, classification and storage of products. It consists of the following systems of identification:

- Identification using RFID technology: RFID reader antennas of HF / UHF, allows reading RF tags and identify the entry and exit of goods.
- Identification using vision-based technology: digital cameras formed area of high, medium and low resolution, 3D cameras, lighting system and control software and image processing for capture and subsequent treatment.



Automatic identification portal

The Inventory Control Module allows testing the continuous replenishment of inventory (or VMI Vendor Managed Inventory) and automated management by using different detection systems and monitoring to assess and evaluate the suitability of each system application. Specifically we use the following detection systems: photocells, inductive sensors, capacitive sensors, load cells and mechanical switches. All detection systems are connected and communicate with a control unit whose logic can be programmed to adapt to the needs of users.



RFID and vision identification technologies



Inductive and capacity sensors in the Inventory Control Module



Photocells in the Inventory Control Module

SMART POINT OF SALE

OBJECTIVES

The main purpose of this facility is to show the capabilities of several ICT solutions in the field of direct sales to consumers.

- Technologies for the identification and collection of products with unique customer support: target small businesses vs. large supermarkets
- Innovative technologies at the point of sale pursuing more efficient logistics and procurement process more user friendly
- Technologies for real-time information about the existing stock of each product on the shelf
- Technologies to replace product according to claim efficiently

EQUIPMENT

- Point of Sale Terminal and automatic debit system.
- Smart shelving for automatic inventory control.

AUTOMATIC IDENTIFICATION SYSTEM INTEGRATED WITH CONVENTIONAL POS.

Aims conducting demonstrations of product movements and traceability within a store environment. It consists of a point of sale terminal, similar to those used in supermarkets, in which the user can identify and weigh the products being purchased at the store.

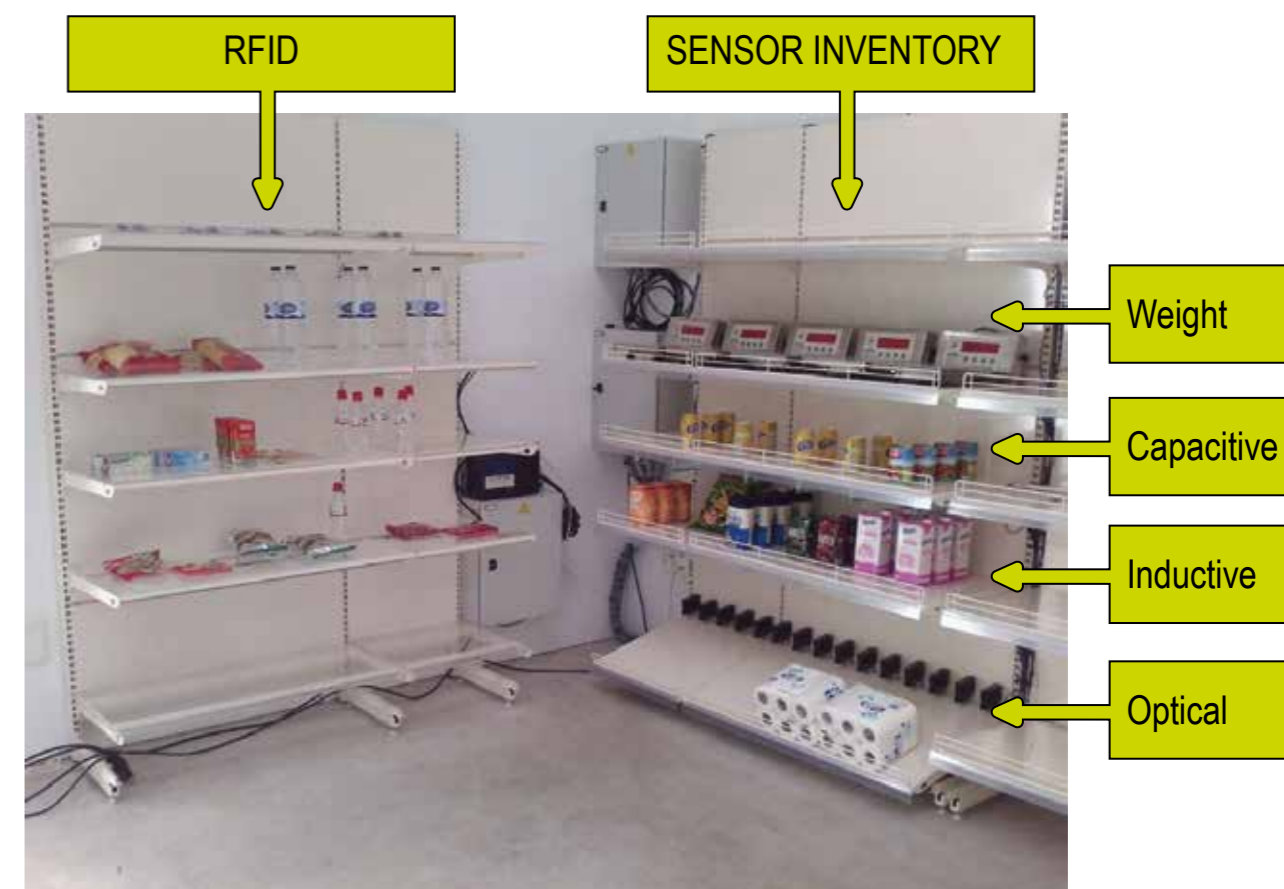
It includes the integration of a product identification solution formed by a bar code reader and a scale.



Point of Sale terminal

SMART SHELVEING FOR AUTOMATIC INVENTORY CONTROL

The smart point of sale solution will be capable of performing real-time control of stock in the product shelves. The solution consists of three linear shelves each controlled by a sensing technology: UHF RFID, vision and sensors (weight cells, inductive, capacitive and optical).



Smart shelf for automatic inventory control

SUPPLY CHAIN MODULE

Objectives

The supply chain module consists of a plastic with the usual components of a supply chain. It includes a physical model (consisting of several suppliers or providers, warehouse and several clients) and an identification model and monitoring system (consisting of a UHF RFID system and a computer vision system).

It is used to evaluate the possibilities of identification systems, monitoring and control of the flow of products common in supply chains, represented by small trays of products that move through the plastic.

- The chain includes the following material streams:
- Any provider can send any other provider trays with products from other manufacturers to complete any order, the store or with the destination of any client.
- From the warehouse is available to send product trays to any client, in terms that the order has assigned only one destination client or a group of them.
- There is a return way from clients to the warehouse or to the providers to simulate inverse logistics.
- The trays located in the customers could be exchanged with any other tray from or to any other equipment in the demonstration center.

Main objectives are:

- Show different identification technologies, control and monitoring of products in the Supply Chain.
- Model, simulate and evaluate the interaction between ICT solutions and different configurations of dynamic and complex SC
- Show the exchange of information between agents of the Supply Chain (manufacturers, warehouse and customers)
- Show applications of electronic invoicing in the Supply Chain



Supply Chain module



Equipment

- Physical model with points of automatic identification, RFID, vision systems.
- Virtual model: simulation and optimization system integrated with the physical model
- Automatic terminal identification for traceability in the Supply Chain
- E-Commerce solutions: EDI, electronic invoicing, connections (FTP, web services, etc)

INTELLIGENT TRANSPORT MODULE

Objectives

This equipment is designed for the simulation of vehicle traffic. Allows static mapping and dynamic mesoscopic, microscopic and macroscopic traffic simulation.

- Technologies for route and drivers planning and fleet management
- Show geographic information systems analysis tools for locating and trip generation
- Technologies for simulation and analysis of traffic congestion

Equipment

- Tool for planning, forecasting and simulate traffic
- Mobile terminals and vehicle on board systems



Vehicle traffic simulation

The main features are:

- Simulation of public transport and heavy traffic.
- Includes 2D and 3D simulations
- Dynamic Traffic Assignment to unexpected delays and route changes.
- Calculation based dynamic route times dependent on weather conditions.
- Travel models based on travel origin – destination tables, movement of vehicles and intersections.
- Model urban highways and behavioral models of vehicles at intersections and roundabouts.
- Modeling high occupancy roads, bus lines and infrastructure of tolls and road construction sites and traffic management during construction.
- Simulation of behavior in tolls and different payment methods.
- Traffic Signal Control and modeling strategies 'queue-jumping' to public transport and other public services.
- Generation of maps, graphs, histograms and charts.
- Travel time estimations and calculations of the shortest path matrices without limits on the number of nodes and network distance.
- Static assignment multi-class, OD matrices settings, matrixes obtaining transverse quality assessment of the current location of detectors for locating detectors recommendations.
- Dynamic traffic assignment based on statistical distributions (logit, c-logic or proportional), dynamic equilibrium models of user and user-defined models.
- Interfaces for GIS and CAD solutions.



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