COREALIS
THE PORT OF THE FUTURE

COREALIS Webinar

Port of Livorno Living Lab

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Port Authority of Northern Tyrrhenian Sea

The port of Livorno (**AdSPMTS**) is classified as a Big Regional (first level port) along the Tyrrhenian corridor, by the Freight Leaders Club, and is a multipurpose port, namely it is equipped with infrastructures and equipment that can berth any vessel and handle any type of goods traffic (LO-LO, RO-RO, bulk solids and liquids, new cars, cruises, ferries, timber and timber derivatives, machinery etc.).

AdSPMTS aims for a complete digitalization of port operations, through R&D and technology transfer enabled by the collaboration with **CNIT**.

Autorità di Sistema Portuale del Mar Tirreno Settentrionale

cnit consorzio nazionale interuniversitario per le telecomunicazioni

MONI.C.A. seaport sensitive playground

TPCS Tuscan Port Community System

In October 2015 the Port Authority of Livorno and the National Inter-University Consortium for Telecommunications (CNIT) signed an agreement for the construction of a joint laboratory, located at the Port of Livorno, with the aim of supporting the activity of ICT innovation of the Porto System.

	2017	2018	
Total traffic (ton)	**16.927.086**	**18.123.892**	**7,1%**
Liquid Bulk	4.637.497	4.613.735	-0,5%
Dry Bulk	413.347	408.661	-1,1%
Containerized Cargo	4.251.845	4.182.091	-1,6%
Ro-Ro	6.799.119	7.981.451	17,4%
Other General Cargo	825.278	937.954	13,7%
Containers (TEU)	**382.067**	**362.108**	**-5,2%**
Passengers (units)	**981.301**	**1.144.337**	**16,6%**
Ferry	738.201	841.571	14,0%
Cruise	243.100	302.766	24,5%
Ro-Ro units	**214.846**	**254.177**	**18,3%**
Commercial vehicles (units)	**350.666**	**351.699**	**0,3%**

https://www.portialtotirreno.it/

Zim Israel – Hapag Lloyd – MSC – Maersk – Hamburg Sud – CMA/CGM – Cosco – Yang Ming – Hanjin - Klines

Objectives of the Livorno Living Lab

Enable **IoT** collecting and aggregating data via yard vehicles and implanted sensors (**oneM2M** standard).

Terminal Snapshot

General Cargo & Yard Vehicles Management System

Designing and setting up a pervasive **5G network** in a CT.

https://trello.com/b/L7he3Koj/livorno-focus-group

General Cargo Management System (I)

The absence of a **General Cargo Management System** is a common issue to many CTs that are able to manage general cargo as well. This scenario focuses on the implementation of a system for the management of the general cargo both during the unloading phase (from the truck) and during the loading phase (on the ship) at the ***CT Lorenzini***, which at present does not have a proper level of digitization/automation of the general cargo. The system will be able to provide to the CT a management tool able to optimize all the operations that are currently carried out manually.

- **Main Control System**
- **Quay Operator**
- **Docks Operator**
- **Ship Captain**
- **Forklift Driver**

LORENZINI&C TERMINAL OPERATOR

ERICSSON

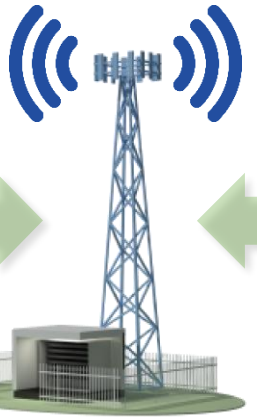
General Cargo Management System (II)

1

Cargo

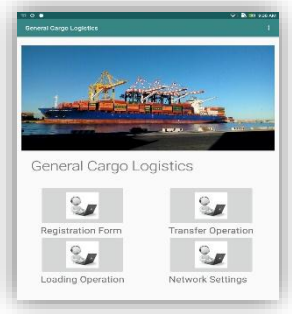
2

LIDAR



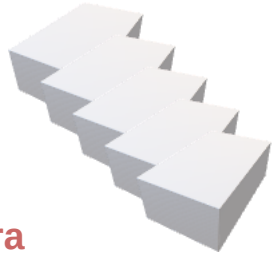
Control System

5G Equipment



4

WDR Camera



Storage Area

3

Cuboid

Record

Data flow and data structure	Definition
loading plan	destination,$_1^n${quantity + size + weight}
goods request	Action, quantity, destination, size, weight
placing request	Action, goodsID, destination, size, weight, forklift ID
pending request	request ID, priority, action, goods ID, destination, size, weight, forklift ID
goods query	request ID, action, destination, size, weight
good selected for transfer	request ID, action, goods ID, location
goods to transfer	request ID, action, goods ID, forkliftID, location
goods position	request ID, location
selected forklift	request ID, forkliftID
request for transfer	requsestID, action, goodsID, forkliftID, location
driver info	requestID, action, goodsID, location
AR Request	requestID, AR, GPS forklift
goods delivered	requestID, delivery status
request ID	unsigned integer
goods ID	unsigned integer
destination	string
size	Length, Height, Width
Length	float number
Height	float number
Width	float number
Weight	float number
Forklift ID	unsigned integer
Action	string
AR	boolean
Delivery status	boolean

Contribution of the Livorno Living Lab to COREALIS

COREALIS Objectives

#1 Embrace circular economy models in its port strategy and operations.

#2 Reduce the port's total environmental footrpint associated with intermodal connections and the surrounding urban environment for three major transport modes, road/truck, rail and inland waterways.

#3 Improve operational efficiency, optimise yard capacity and streamline cargo flows without additional infrastructural investments.

#4 Enable the port to take informed medium-term and long-term strategic decision and become an innovation hub of the local urban space.

Measurable Objectives

- Vessel operation completition time reduction.
- Loading/Unloading operations time reduction.
- Occupied space reduction.
- Average time of activity/inactivity of the yard vehicles.
- Total number of movements per unit of cargo.
- Vehicle-Call time reduction.

General Cargo Management System

Model-Driven Real Time Control module (RTPORT)

6 Conclusions

Innovation

The validation and testing phase will allow the evaluation of the performances of the whole system that has been presented. Currently there are no similar solutions on the market for the management of the **General Cargo**.

Ongoing

RTPORT **Setup.**

August 2019

RTPORT **Alpha version.**

October 2019

RTPORT **Performance Report.**

RTPORT Roadmap

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THANK YOU FOR YOUR ATTENTION

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