Use of ICT for more efficient port operations: The experience of the EASYLOG project

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- **WORK CONTENT**

This study presents the experience of the **Easylog Project – Optimized logistics for ports and intermodal transport** – funded under the Interreg IT-FR Maritime 2014-2020 program.

Focus: Ro-Ro trade and use of ICT technologies to increase the performance of intermodal transport chains and the overall quality of the services offered by ports.

Innovative aspect: systemic implementation of cutting-edge services and tools and their integration and interoperability aimed at activating synergies for the development of a cross-border community of port logistics.

- **THE TEST AREA**

4 Tyrrhenian regions
Corse (France)
Liguria (Italy)
Sardinia (Italy)
Tuscany (Italy)

5 ports
Bastia
Livorno
Olbia
Portoferraio
Savona–Vado

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- **BACKGROUND – A highly fragmented context**

Lack of systemic vision on different scales:

- within the port
- between ports
- between the various actors involved

Different (and often divergent) needs and interests:

- **port operators** need to monitor the vehicles in the port for an optimal yard and berth management;
- **port authorities** need to monitor port events and supervise the port areas for security purposes;
- **logistics and trucking companies** need to speed up port operations, check the location of goods and respect delivery times;
- **shipping companies** want to efficiently manage loading/unloading procedures and related lists.

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- **BACKGROUND – Road haulage sector**

Strong fragmentation: high number of small- and medium-sized companies

In Italy:
- 87,361 road haulage companies registered in 2018
- more than 62,000 have less than 5 vehicles **[Italian register of road hauliers, 2019]**

Small companies have **limited opportunities** to invest in innovation (both digital and non-digital), training, and networking.

Larger companies make often use of digital systems for fleet tracking, control of consumption, monitoring of dangerous goods, etc. Systems are mostly **developed in-house** and **not designed to interact** with the other nodes and operators of the logistics chain.

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BACKGROUND – Port sector

- Digitalization levels differ heavily from port to port
- Extensive use of traditional methods of document exchange and manual management of the entire gate-in/gate-out procedure is still predominant
- Automated control systems for the duration of the port stay are rare and so are computerized archives of port accesses, with important limits related to security issues
- Port Community Systems (PCS) are spreading in several ports but the applied systems and procedures vary widely

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- **BACKGROUND – Port sector**

- In Italy, the Directive “Guidelines to homogenize and organize the PCSs through the National Logistics Platform” 20/03/2018 of the Ministry of Infrastructure and Transport has introduced the obligation for Port System Authorities to migrate their PCSs to the National Logistic Platform – NLP

- Although the change promoted by the Directive is ambitious, to date its level of acceptance is very low and a high level of uncertainty surrounds its practical implementation

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- **GOAL OF THE STUDY**

Design a system that allows the five ports to be connected using a common digital language and overcoming the poor coordination between subjects

Such a system is designed to meet the following objectives:

- **optimize the exchange of information in gate-in/gate-out activities** to minimize the time required for documentary checks and ensure greater integration between the subjects involved and better plan of port activities
- **increase the security of port operations** through the automated management of port gates and the continuous monitoring of port accesses
- **improve truck-turn-around-times** at the terminal by reducing the bottleneck effect of ports.

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- **DEVELOPMENT PLAN OF THE RESEARCH**

1. **Cognitive phase**: acquiring knowledge regarding port procedures and associated information flows, ICT systems in use, subjects involved, operational and technological needs.

2. **Design phase**: definition of the functional requirements of the new system in terms of application and information services that respond to the operational needs identified.

3. **Implementation phase**: development of the IT architecture of the new system and automation of the access gates at the five test ports.

4. **Experimentation phase**: training to operators for the use of the new system and in situ experimentation.

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DEVELOPMENT PLAN: 1 - COGNITIVE PHASE (a)

- HOW: interviews with stakeholders and on-site visits at the 5 test ports
- WHAT EMERGED: very different levels of automation and digitalization

PORT	STATE OF FACT	SPECIFIC NEEDS
Livorno	The Port of Livorno has a gate-automation system which allows the detection of the vehicles at the port gates. It has advanced digital assets, including the TPCS (Tuscan Port Community System), which constitutes the unique interface towards the port and logistics community. The TPCS is equipped with a "VBS-Vehicle Booking System" module which allows the management of entry and exit reservations of vehicles from the port, to date limited to container traffic.	• extend the VBS module to rolling cargo, in order to allow the automatic generation of the loading list, on the basis of: i) booking data received from the VBS, ii) gate-in data received by the gate automation system, iii) gate-in messages sent by the terminal, boarding messages sent by the terminal; • create interfaces for data exchange with the EASYLOG platform, in order to share data of interest for the other ports involved in the experimentation.
Olbia	The Port of Olbia is not currently equipped with any telematic support for the management of the physical and information flows relating to Ro-Ro traffic. Access is manned by terminal staff.	• introduce a monitoring system for port access, which can allow the control and monitoring of all incoming and outgoing vehicles; • introduce a yard management module.

- **DEVELOPMENT PLAN: 1 - COGNITIVE PHASE (b)**

Main criticalities identified:

- different availability of input data
- well-known resistance opposed by some stakeholders to share part of the information requested **[Acciaro and Serra, 2014]**
- different operating modes existing in the ports involved
- diverse state of the art and technology in the five ports
- presence of different trades managed within the sample ports

Need: customize the automation equipment of the gates and the management system on a case-by-case basis

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- **DEVELOPMENT PLAN: 2 - DESIGN PHASE (a)**

Driving principle:
develop a system that can potentially become a "standard model" for communication between ports, primarily for rolling cargo but with the possibility of further expanding its application to different trades.

Basic criteria:
- satisfaction of the needs detected in analyzes and interviews
- ability to exchange data between the five ports in the network
- future opening to additional ports currently not included in the test
- use of open and extensible standards in the future
- interoperability with the ICT systems already in use and with the new gate automation system
- the infrastructure should not be based on centralized supports to be maintained by third parties

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- **DEVELOPMENT PLAN: 2 - DESIGN PHASE (b)**

Modules of the EasyLog system:

- module for managing the **pre-arrival notification** through ship travel bookings
- **gate-in/gate-out automation** module to identify and record each entity entering or leaving the port area
- **yard management** module for accompanied and unaccompanied Ro-Ro traffic
- **mobile module** by means of personal digital assistants (PDAs) for the management of vehicles in movement in the yard
- **damage control** module
- **data exchange** module

Customizability: Each port in the network can activate one or more of the previous functions. Each function is customized according to what is already in place and the specific local needs

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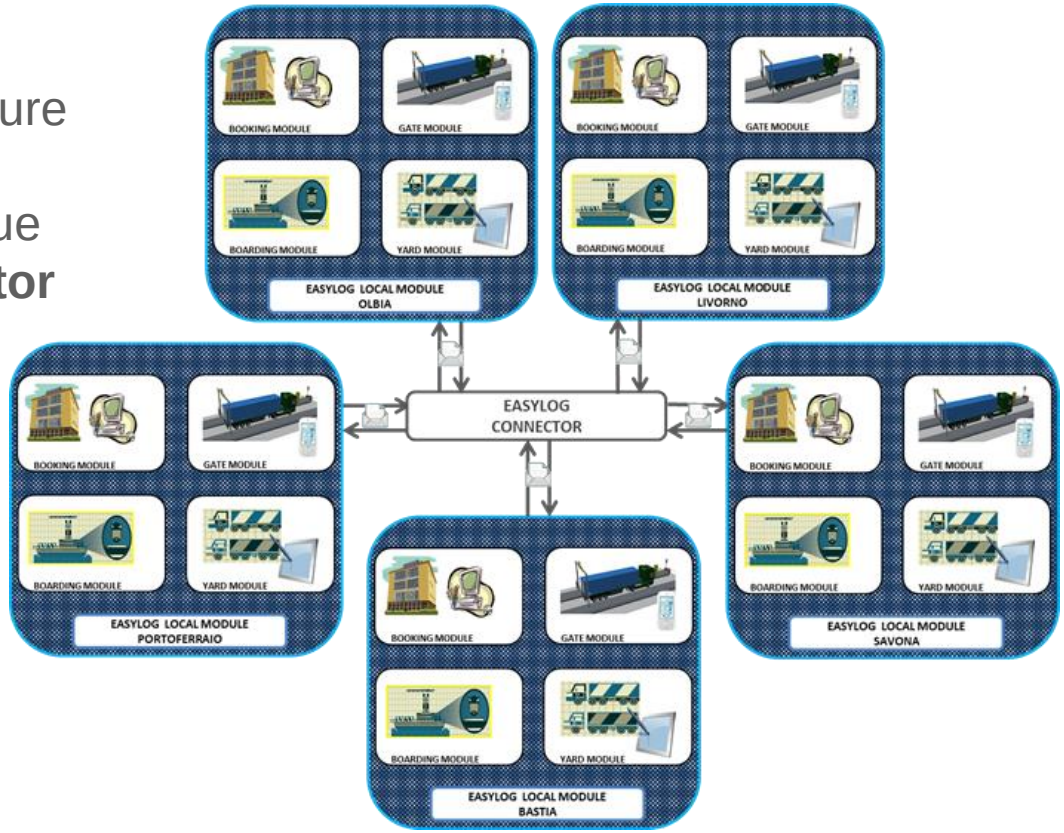
- **DEVELOPMENT PLAN: 2 - DESIGN PHASE (c)**

- A modular and scalable structure
- The five local modules dialogue through the **Easylog connector**



- **DEVELOPMENT PLAN: 2 - DESIGN PHASE (d)**

Each local module consists of:

- **a software component -** for data processing, storage and exchange
- **a hardware component -** automated port gate

As regards the **software functionality**, the system allows:

- the terminal of destination to know the composition of the incoming cargo in terms of type and number (or linear meters) of vehicles to timely and properly organize port spaces and activities
- the ports to reconstruct the origin and destination of the goods starting from the data collected by the automated gates;
- under reasoned requests in case of disputes on damages, to provide the terminal operator with the recorded images of the visible sides of the trailer when accessed to the port, indexed by plate number and access date/time

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- **DEVELOPMENT PLAN: 2 - DESIGN PHASE (e)**

Hardware component: automated gate

Easylog gates are based on OCR Technology (Optical Character Recognition) that converts visual data to digital data

Basic functionality of the gates include:

- reading of the truck license plate
- reading of ADR codes, if any
- detection of vehicle length and capture of images for damages detection
- management of other passing vehicles (service vehicles, employee vehicles, passenger car traffic, etc.)

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- **DEVELOPMENT PLAN: 2 - DESIGN PHASE (f)**

Depending on the existing local situation, the Easylog gates are implemented according to **two levels of automation**:

- **hard automation** – installation, over the entrance and exit gates, of classic physical portals equipped with OCR cameras, entry and exit barriers, sensors, etc.

- **light automation** - creation of more flexible and economic "virtual" gates realized by means of PDAs and wearable OCR smart glasses for augmented reality to be used by trained personnel

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WHERE WE ARE AND NEXT STEPS

- the implementation of the five gates is underway in the five ports
- the Easylog system and its automated gates are going to be tested in the coming months to assess their applicability and effectiveness
- the potential integration of the Easylog system with other logistics platforms will be further studied in an effort to embrace a more holistic vision of supply chain digitalization

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MANY THANKS
FOR YOUR ATTENTION

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