



الأكاديمية العربية للعلوم والتكنولوجيا والنقل البحري
Arab Academy for Science, Technology & Maritime Transport



The International Maritime Transport and Logistics Conference "Marlog 9"
Impacts of the Fourth Industrial Revolution on Port-City Integration
"World Port Sustainability Program Aspects"



SHARED ICT SOLUTIONS FOR PORTS: THE EASYLOG PROJECT

Serra P., Fancello G., Zoratti A., Bozzo R.

Patrizia Serra – University of Cagliari (Italy)

10 - 12 October, 2020

WORK CONTENT

This study presents the experience of the **Easylog Project – Optimized logistics for ports and intermodal transport**



Focus: Ro-Ro trade and use of ICT technologies for improved operations

Innovation: systemic implementation of cutting-edge services and tools and their integration for the development of a cross-border community of port logistics.





TEST AREA

4 Tyrrhenian regions

- Corse (France)
- Liguria (Italy)
- Sardinia (Italy)
- Tuscany (Italy)

5 ports

- Bastia
- Livorno
- Olbia
- Portoferraio
- Savona–Vado



BACKGROUND – A highly fragmented context

Lack of systemic vision on different scales:

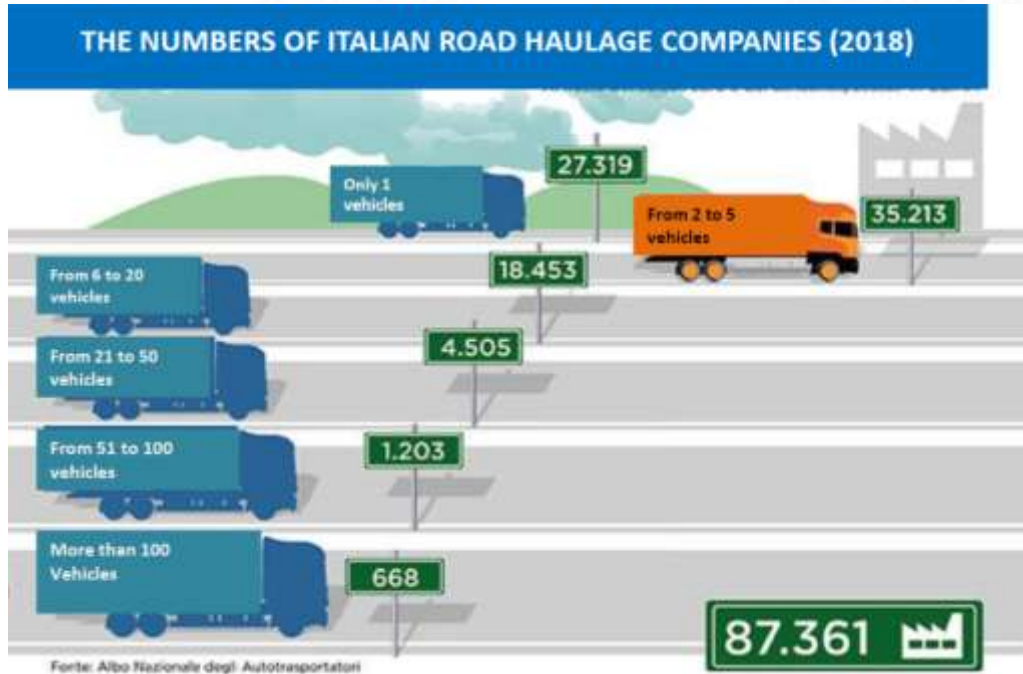
- within the port
- between ports
- between the various actors involved

Different (and often divergent) needs and interests:

- **Port operators** need to monitor cargo flows for optimal yard and berth management;
- **Port authorities** need to monitor port events and areas for security purposes;
- **Logistics companies** need to speed up port operations, check the location of goods and respect delivery times;
- **Shipping companies** need to efficiently manage cargo operations and related lists.

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



BACKGROUND – Road haulage sector (2)

SMALL COMPANIES:

Limited opportunities to invest in innovation, training, and networking.

LARGER COMPANIES :

Greater opportunities to invest in digital systems (fleet tracking, control of consumption, monitoring of dangerous goods, etc.)

Systems mostly **developed in-house** and **not designed to interact** with the other nodes and operators of the logistics chain



BACKGROUND – Port sector

- Different port digitalization levels
- 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
- Port Community Systems (PCS) are spreading in several ports but the applied systems and procedures vary widely





BACKGROUND – Port sector

A glance at the Italian situation

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

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



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

The system is designed to meet three main objectives:

1. Optimize the exchange of information in gate-in/gate-out activities
2. Increase the security of port operations
3. Improve truck-turn-around-times





DEVELOPMENT PLAN OF THE PROJECT

- 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





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.	<ul style="list-style-type: none">- 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.	<ul style="list-style-type: none">- 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 stakeholders to share the information requested
- 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

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.

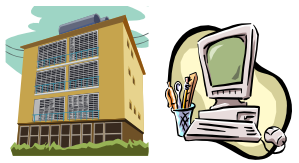
Basic criteria:

- 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 in use and with the new gate automation system
- infrastructure not based on centralized supports to be maintained by third parties




DEVELOPMENT PLAN: 2 - DESIGN PHASE (b)

Modules of the EasyLog system:



BOOKING MODULE




PRE-ARRIVAL NOTIFICATION MODULE




GATE MODULE



DAMAGE CONTROL MODULE



BOARDING MODULE



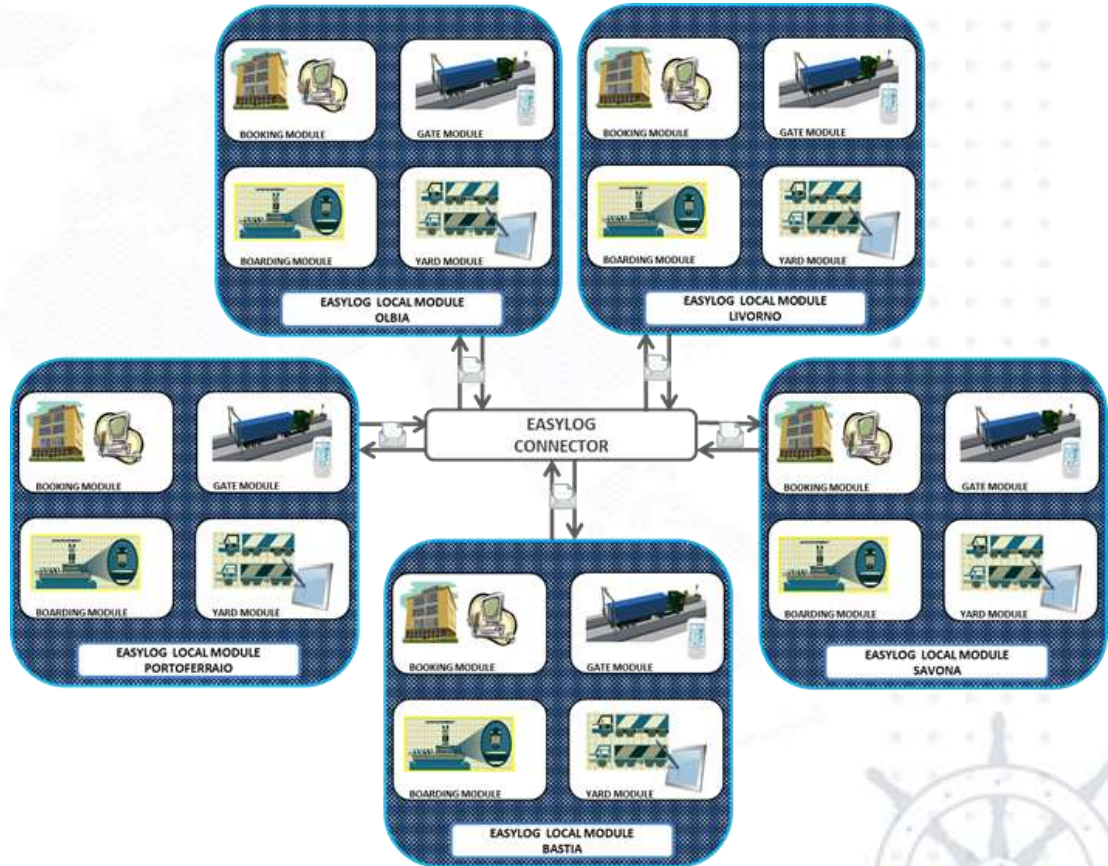
YARD MODULE

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

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)

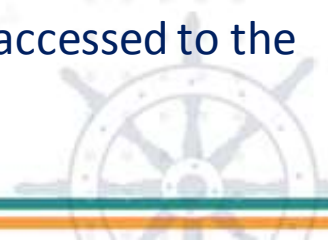
Each local module consists of:

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

Software functionality

The system allows:

- the terminal of destination to know the composition of the incoming cargo 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



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:

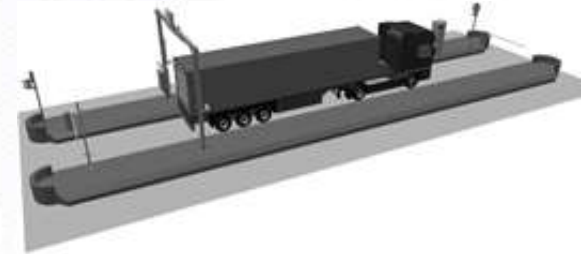
- reading of the truck license plate
- reading of ADR/IMDG codes, if any
- detection of vehicle length and capture of images for damages detection
- management of other passing vehicles (service vehicles, passenger car traffic, etc.)



DEVELOPMENT PLAN: 2 - DESIGN PHASE (f)

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

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



2. 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





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 (from February to May 2021) 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





MANY THANKS FOR YOUR ATTENTION

Patrizia Serra
pserra@unica.it

