

# Digitalization of Freight Transport in the Mediterranean: Reflections on Use Cases' Findings

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## Introduction

### *Abstract*

The digitalization of the supply chain and Customs is a complex challenge, but it offers the potential to significantly improve the efficiency, security, and sustainability of global trade. The International Fast & Secure Trade Lane (IFSTL) is a trade facilitation initiative that aims to address these challenges using interoperable digital technologies.

IFSTL offers several benefits to all users in the supply chain, including enhanced multimodal coordination and efficiency, improved visibility and traceability of goods, reduced costs and dwell times, and increased security. The implementation of this approach requires supportive policies and regulations at the national and international levels as well as mature and reliable enabling technology.

This article offers a perspective on the above-mentioned considerations along with a concrete application in the pilot project connecting the ports of La Spezia (Italy) and Casablanca (Morocco), illustrating with the direct contributions from the players the perspective in facing challenges and seize business opportunities. However, the picture changed dramatically some months ago. A combination of factors external to logistics chains, coupled with internal tension in logistics and shipping, gave rise to the perfect storm. As a result, the transport and logistics sector is now struggling more than ever to deliver an efficient and predictable service.

### ***Background: The challenge of digitalisation for Supply Chain and Customs***

IFSTL is a trade facilitation initiative aimed at optimizing strategic and operational effectiveness in the port system by utilizing harmonised tools (software solutions, operational guidelines and governance models) to address modern supply chain complexities. Continuous evaluation of management processes is indeed crucial for optimizing strategic and operational effectiveness. The IFSTL concept confers some key benefits on all users in the supply chain:

- Coordinated multimodal operations in the international logistics chain, possibly supporting the decision-making processes in real-time. [1,7]

- Increased efficiency of different transport modes (road, rail, sea) by channelling their processes through technological platforms.
- Advanced data sharing by implementing new tools for efficient freight management.
- Increased visibility of multimodal transportation and tracking of goods through a single interface, with significant reduction of decision-making time, real-time incident resolution, and goods dwell time.
- Streamlined Customs procedures, through the widespread adoption of IoT (Internet of Things) technologies.

The above-mentioned objectives can be achieved by integrating advanced technological solutions throughout the entire supply chain, specifically identifying five distinct IFSTL components:

- Platform: the back-office component of IFSTL, implementing the business logics for collecting, aggregating and persisting data, and for exchanging them with external systems.
- Dashboard: offers a user-friendly, real-time, and easy-to-read visual representation of goods' status, enabling immediate and informed decision-making
- Field component (Gate Automation): the collection of equipment, hardware and software to automatically read and manage information coming from electronic seals (eSeals) installed on trailers and cars, like passive RFID (Radio-Frequency IDentification) tags and labels [4].
- Mobile component: a software application installed on handheld devices (e.g., rugged smartphones) enabling operators to "baptize" eSeals and verify their integrity at each checkpoint.
- Logistic Optimizer: an optional DSS (Decision-Support System) for modelling and optimizing the synchro modal planning in port/rail terminals.

National/EU governments significantly contribute to the implementation of the IFSTL concept by promoting trade and security through policies, infrastructure investments, digital trade systems, and security measures.

***Policy Framework: Key Policy Considerations for International Fast and Secure Trade Lanes***

Customs administrations and government organizations have a pivotal role in the advancement of technologies aimed at enhancing the management of trade activities. This is achieved through the implementation of international conventions, national and European legislation, as well as cross-border agreements. In order to maximize efficiency and productivity, infrastructural projects should prioritize efficiency, sustainability, digital solutions, climate resilience, and emerging technologies to enhance economic system productivity, business placement preferences, and institutional effectiveness. [8,14]

At European level, these are the most notable regulations related to the IFSTL concept:

- Regulation (EU) 2016/679, General Data Protection Regulation (GDPR), which governs personal data collection, use, and sharing. [11]
- Regulation (EU) 2020/1056, Electronic Freight Transport Information (eFTI), establishing a legal framework for the electronic communication of regulatory information relating to the transport of goods on the territory of the Union. [9]
- Regulation (EU) 2019/1239, establishing a European Maritime Single Window environment (EMSWe). [10]
- Regulation (EU) No 952/2013, laying down the Union Customs Code. [12]

The last three regulations (and associated Implementing Acts) establish regulatory and technological frameworks for exchanging data in relevant domain of application, but do not extensively cover cross-domain interoperability issues and are usually focused on B2A (Business-to-Authority) and A2A (Authority-to-Authority) transactions, leaving the B2B (Business-to-Business) domain out of scope. To fill this gap, the direct cooperation between public and private operators (covering all the types of transactions: B2A, A2A and B2B) is then crucial for efficient global transportation systems, and flexibility and adaptability of regulation are key factors in policy evolution. [11,13]

## Main Sections

### *Pilot Case: IFSTL from La Spezia (Italy) to Casablanca (Morocco)*

EU Logistics projects focus on digitalization in ports, as a strategic node within the end-to-end logistics chain, to optimize trades, promote modal integration and enhance interoperability, aligning with the European Green Deal and CEF (Connecting Europe Facility) Funding instrument guidelines.

Building upon previous studies and small-scale pilot projects on national corridors, the International Fast & Secure Trade Lane (IFSTL) concept has been further developed within the CEF project FENIX European Federated Network of Information eXchange in LogistiX (Action Number: 2018-EU-TM-0077-S) [3], where it has been piloted on three full-scale international corridors between Italy and Morocco, Egypt and Turkey, and subsequently replicated on another CEF project taking its full name (INTERNATIONAL FAST AND SECURE TRADE LANE Improving the Dublin – Cherbourg MoS route, Action Number 2019-EU-TM-0193-S). [2,6]

More specifically, the pilot project between Italy and Morocco aimed to explore the benefits and effects of interoperable digital platforms and IoT in terms of [5]:

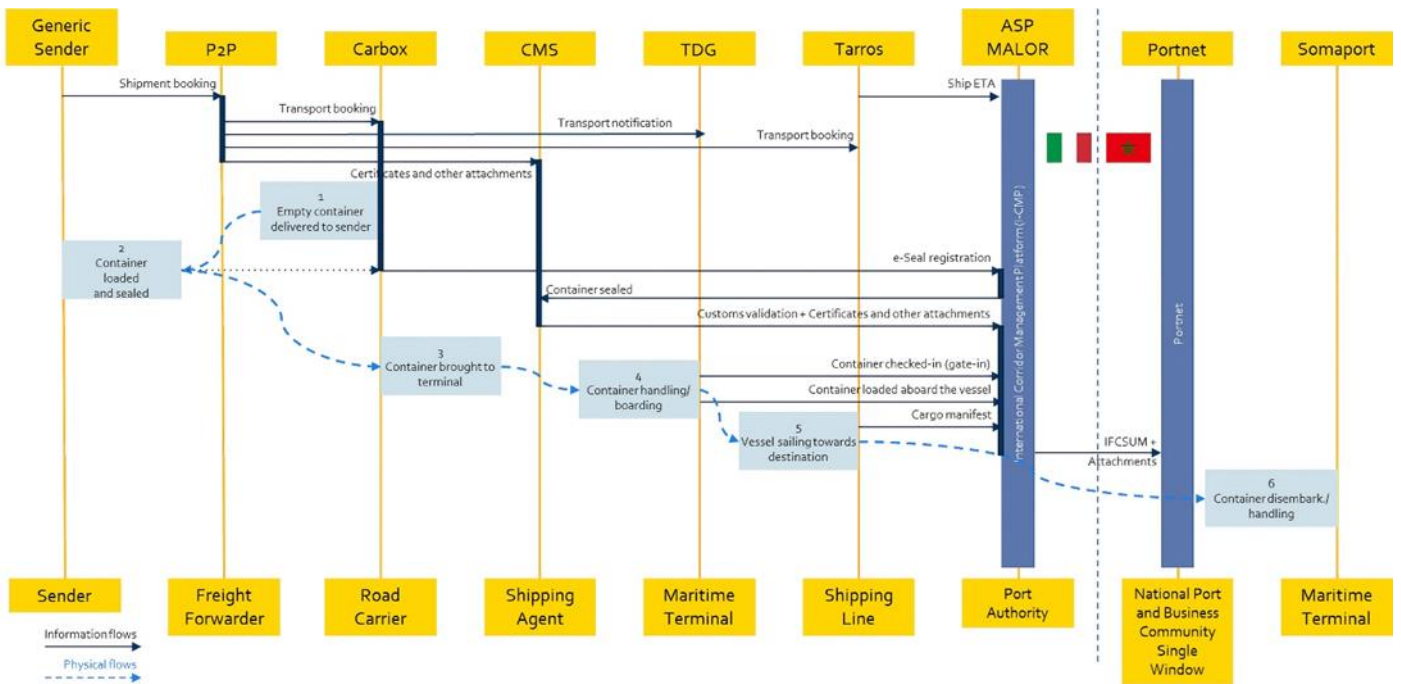
- Enhanced multimodal coordination in the ports of La Spezia and Casablanca (and related logistics corridor).

- Removal or mitigation of bottlenecks (e.g., documental interchanges), according to the needs of logistics operators.
- Enhanced coordination between different transport modes.
- Increased efficiency, service quality, and ease of use through centralized information flows.
- Provision of advanced information services to transport and logistics operators, for a more efficient management of goods transport.
- Visibility and traceability of goods shipped through a single interface, including cross-border and non-EU connections, thereby reducing the permanence of goods in ports.

These objectives have been pursued through the digitalization/automation of the following information flows:

- Cargo manifest and Customs data: declaration of the goods aboard the ship, for Customs clearance purposes.
- Vessel ETA (Expected Time of Arrival), updated in real time.
- Port Gate-In/Gate-Out: transit of the container at the port terminal gate.
- Container boarding/disembarkation.
- eSeal status: integrity status of the electronic seal affixed to the container.

The following diagram shows how the information above is handled in a sample export cycle from La Spezia to Casablanca; please note that all Italian logistics operators (P2P, Carbox, etc.) are part of the Tarros Group.



*Digitalized information flow in a sample export cycle from Italy to Morocco*

*(Source: Circle Group; FENIX project)*

Digitalization of information flows offers benefits like document simplification and reliability, speed of exchange, and cost savings. These benefits are even more important when applied to the Customs processes, where the anticipation of documents and certificates, the pre-clearing of goods, and the automation of port security checks bring a substantial reduction of the overall clearance time. Digitalized documents are uploaded and associated with each container by the shipper, and then made available to logistics parties for security and customs purposes, through the simple consultation of the dashboard (according to the granted access level).

IoT technology stands at the very core of IFSTL, by providing devices on containers that share information about their status, enhancing security and customs processes, and warrants further study. IFSTL utilizes electronic seals (eSeals) to track the movements of containers and report about their status each time they are read by dedicated devices (RFID antennas at terminal gates or handheld devices for terminal operators), sharing status information like open, closed, or broken. Furthermore, eSeals are associated (“baptized”) with transport documents through the mobile component, making it possible to have a continuous tracking of integrity status and to automate Customs clearance procedures.

All the benefits above have been measured and assessed through a pervasive validation campaign, based on the following KPIs (Key Performance Indicators):

- Reduction in the overall number of paper documents and manual data entry per shipment.
- Reduction in the processing time for Customs documents.

- Reduction of stationary time of trucks for gate-in/gate-out operations at port terminal gates.
- Reduction in the duration of Customs clearance procedures.

***The perspective of the private players: Tarros Group***

Tarros Group is a primary Italian logistics operator connecting 16 countries and 31 ports across the Mediterranean Sea. In particular, the traffic between Italy and Morocco, estimated at over €1.5 million/year, represents a strategic business for Tarros, thus making the IFSTL pilot project on the corridor La Spezia-Casablanca particularly relevant.

All the logistics companies in Tarros Group took part to the pilot project, thus putting into practice the advantages of the IFSTL concept at every step of the logistics chain.

From the forwarding agent point of view, a greater control and an accurate electronic traceability of cargo led to greater data transmission efficiency, reduction (or elimination) of data entry errors, better monitoring of goods, immediate detection of any tampering, and, even more important, the certainty of receiving at final destination the intact cargo stowed by the exporter.

From the Customs point of view, the system does not change the type of documents; what differs significantly, is the way in which the aforementioned documents are transmitted to destiny. Traditionally, they "physically" follow the cargo using the ship itself or some express courier as carriers; with IFSTL, the documents are digitalized and transmitted to the destination with paperless procedures.

The combination of digitalisation and electronic seals enabled a valuable reduction in both Customs clearance times at destination (virtually zeroed) and physical checks on the goods. Within the pilot project, it has been estimated that the average sailing time from La Spezia to Casablanca takes about 5.5 days, while the corresponding driving time for carrying a single container through France and Spain is about 4 days. The Customs clearance times in the two cases are about 2.5 days and 0.5 days, respectively, taking the “gate-to-gate” time to 8 and 4.5 days. Even considering the much lower price of the maritime transport, the nearly doubled time constitutes a severe loss of competitiveness vs. the road transport.

A substantial reduction of Customs clearance time for maritime transport (as enabled by IFSTL) would make the “gate-to-gate” time (5.5 days) almost comparable with the road transport; thus, a large-scale application of the IFSTL concept would enable a remarkable recovery of competitiveness, which in turn is expected to contribute to the modal shift, thus bringing direct benefits to Tarros Group (in terms of efficiency and revenues) together with valuable indirect benefits such as a reduction in truck traffic flows and significant CO<sub>2</sub> savings.

During the preparation and execution of the pilot project, the only remarkable issues were some initial difficulties in establishing a communications link between the two Customs agencies, and the lack of harmonization between the two legislation systems.

To conclude, Tarros Group believes that in the long term the IFSTL concept can guarantee the creation of effective customs corridors enabling an all-round control over the goods and an agile transit through borders.

### ***The perspective of the public players: Eastern Ligurian Sea Port System Authority***

The IFSTL pilot project helped the Eastern Ligurian Sea Port System Authority to assess innovative tools for the digitization of the logistics corridors to and from the Port of La Spezia. As strategic goal, the Port Authority has the aim of supporting the operators of the port system community by encouraging the application of innovative technologies that incentivize trades for the ultimate benefit of the local economic community.

From a technological perspective, this goal has been achieved through the enhanced interoperability between the PCS (Port Community System) of La Spezia (APnet) and its Moroccan counterpart (Portnet), through a dedicated module (International Corridor Management Platform).

However, without the Memorandum of Understanding signed by the Eastern Ligurian Sea Port System Authority and Moroccan Agence Nationale des Ports (ANP), the challenge of integrating the information systems implemented in the ports of La Spezia and Casablanca through a global logistics corridor would not have been realized. Furthermore, the harmonization of different standards and protocols was realized thanks to the collaboration with the Italian Customs Agency.

In conclusion, commercial exchanges between the ports of La Spezia and Casablanca are increasingly efficient thanks to the positive results of the IFTSL pilot project, aimed at creating an international seamless logistic corridor between the two ports.

This kind of innovative projects, in which the Port System Authority of the Eastern Ligurian Sea expects to invest increasingly, can contribute to increase relations between its own ports and the countries around the Mediterranean basin, which are strategic partners from a commercial point of view.

### **Conclusions and Recommendations**

The pilot projects carried out within FENIX proved as the IFSTL concept is a key enabler for enhancing the overall efficiency of the multimodal logistics chain; more specifically, the solution validated on the corridor La Spezia-Casablanca saw the full satisfaction on involved public and private operators, with tangible results achieved especially in terms of document management simplification and Customs clearance time, which in turn resulted in increased efficiency of the administrative and operational processes, with reasonable infrastructural investments (e.g., automated gates at port terminals) and operational costs (e.g., non-recyclable eSeals). The substantial reduction of Customs clearance time would make the “gate-to-gate” time of maritime transport more attractive and, where feasible,

comparable to road transport, thus improving the competitiveness of this transport mode and likely shifting some cargo traffic from road to sea.

However, these results are only possible through a pervasive series of initiatives that go beyond the mere deployment of technologies; to this purpose, the major recommendations for future implementations of the IFSTL concept are the following:

- To ensure the proper operation of the concept, it is crucial to build a receptive ecosystem at port level; in this perspective, Port Authorities play a key role in involving all public/private operators.
- For such purpose, it is highly recommended to plan a pervasive communication campaign (webinars, meetings, focus groups) for creating a common understanding and a unity of purpose for all the parties from the very early stages of the project.
- The engagement of Public Authorities might require time; hence, as a part of such launch activities, it is crucial to establish a public/private working group including all involved authorities at both sides of the corridor; again, Port Authorities must operate as facilitators for reaching all needed administrative bodies.

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